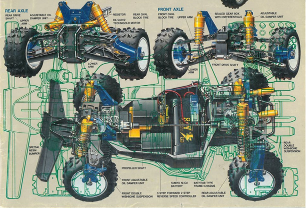
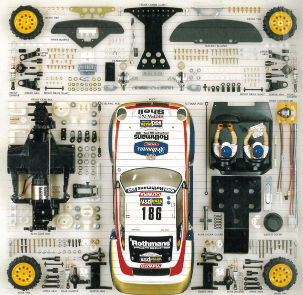
TAMIYA RADIO CONTROL GUIDE BOOK

TAMIYA


REAR AXLE
REAR DRIVE SHAFT
UPPER ARM
ADJUSTABLE OIL DAMPER UNIT
RESISTOR
RX-540VZ TECHNIGOLD MOTOR
REAR OVAL BLOCK TIRE
LOWER ARM
FRONT AXLE
FRONT OVAL BLOCK TIRE
UPPER ARM
SEALED GEAR BOX WITH DIFFERENTIALS
ADJUSTABLE OIL DAMPER UNIT
FRONT DRIVE SHAFT
LOWER ARM
SPECIAL RESIN BUMPER
PROPELLER SHAFT
FRONT ADJUSTABLE OIL DAMPER UNIT
FRONT DOUBLE WISHBONE SUSPENSION
TAMIYA Ni-Cd BATTERY
3 STEP FORWARD 2 STEP REVERSE SPEED CONTROLLER
BATHTUB TYPE FRAME/CHASSIS
REAR ADJUSTABLE OIL DAMPER UNIT
REAR DOUBLE WISHBONE SUSPENSION



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TAMIYA RADIO CONTROL GUIDE BOOK

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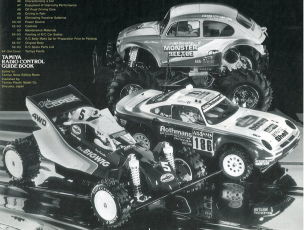
Toys they're not.



ENJOY RADIO CONTROL

ENJOY RADIO CONTROL

A great number of people today are enjoying radio controlled models. They find excitement in the precise mechanism and excellent maneuverability of these models. Some people enjoy customizing to increase their performance and, furthermore, organize races and competition. All of these categories offer limitless enjoyment to the fans. The reliable radio control unit, which was once a very expensive gadget, has come to be within a reasonable price range as the science of electronics has advanced. Also new car and airplane kits are coming on the market one after another in increasingly refined form. The radio controlled electric car models are becoming more popular among not only novices but also skilled modelers because of high performance in spite of their easy handling. Many enthusiasts are attracted by the exciting operation and realistic make up of radio controlled electric tanks, too.

This guide book is compiled to focus on the fundamental knowledge of the radio controlled electric model cars, on hints of assembly and adjustment, on operating techniques, and on racing, with our hope that this book can be instructional and help you enjoy the sport as well.

1. RADIO CONTROLLED MODELS

Radio controlled models are nothing but models remotely controlled by radio signals. So most operating models, if they are big enough to mount radio control units, can be converted for radio control. Radio controlled models are classified under kinds of power units; there are ones with gas powered engines, with electric motors, with steam engines, and ones with no power units like sailboats and gliders. There are airplanes, helicopters, gliders, racing cars, buggies, tanks, boats and some others, each of which has many fans.

However, as for the radio control units, most of them in use today are fundamentally the same; they are the digital proportional type, although their capability varies from unit to unit.

2. R/C ELECTRIC CAR

Radio controlled electric powered cars are ideal for those considering R/C modeling as a hobby. Its high performance can satisfy even the most discriminating enthusiast, and races can be held easily without air or noise pollution. For this simple reason, electric powered R/C cars have become very popular world-wide.

There are many types of R/C car models on the market, and can be classified as listed below:

- 1/12 scale Racing car and 1/10 scale Formula car
- 1/10 scale Off-road car and Racing buggy
- 1/24 scale On-road racing car

If you intend to remain in the electric R/C car hobby for a long time, and compete in races, it is suggested that you select your car from one of these fore-mentioned categories.

1/12 scale racing cars and 1/10 scale Formula cars run at speeds of up to 45km/h. They provide powerful, dynamic and thrilling driving enjoyment. On the other hand, 1/10 off-road racers and buggy cars let you run on any type of terrain, such as unpaved areas, sand, hills, dry riverbeds and other places where on-road cars can not go. They have larger body sizes than on-road cars so they can take the rough road running and obstacles. Off-road racing and buggy racing provide you with more of the rough and tumble actions as compared with on-road car racing.

Tamiya 1/24 scale Tamtech cars have become popular compact scale R/C models. Its compact size allows you to enjoy it in or outdoors. Even its running performance and chassis components are the same as on the larger scale R/C models, so that none of the excitement is lost.

DIFFERENCE BETWEEN RADIO CONTROLLED MODELS AND TOYS

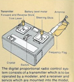
There are many radio controlled toys sold on the market these days. The characteristic of toy products are inferior in capability to models; for instance, they can turn only in one direction or run very slowly. Of course, some of them are close to the border line between models and toys. A conclusive factor is that the toy is always sold in the completed form, while the model is presented in a kit form with components unassembled which are left to you to finish, no matter how little the assembly may be. So the model may be finished in varying levels of performance ability according to the skill of the assembler. Also, they are able to be improved and customized with accessories available on the market. This is another phase of attraction of the model-level products.

RADIO CONTROL SYSTEM

When you have bought a model, a radio control system designated for the model should be purchased separately which then is to be installed into the model, such as an airplane or car.

Most predominant radio control systems on the market today are the digital proportional type. In short, they are called a radio. For radio controlled electric cars and tanks, a two channel digital proportional system is used.

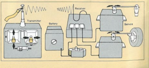
1. MAKEUP AND OPERATION OF DIGITAL PROPORTIONAL



The digital proportional radio control system consists of a transmitter which is to be operated by a modeler, and a receiver and servos which are mounted into the model, and power supplies for the units. A transmitter functions as control box, fitted with operating sticks and trim levers for fine adjustment. When the transmitter is in operation, it emits signals by means of radio waves. The signals are accepted by a receiver and sent to servos, which translate the signals into mechanical movements. A servo motor in the servo rotates in either direction at some velocity for some duration of period according to the signals given. The mechanical movements are put out from a servo horn to a model unit to be controlled. Thus, the whole model can be manipulated. The word "proportional" of "digital proportional" indicates that a model is controlled in proportion to the degree that sticks of the transmitter are moved. When you move a stick quickly, the servo motor rotates quickly and the servo horn moves quickly. When the movement of the stick is stopped halfway, the movement of the servo horn will also stop halfway. In other words, you can control a model car at will by manipulating a stick of the transmitter quickly or slowly, to full range of throw or halfway; the movement of the servo horn is hooked up to be transmitted to, for instance, front wheel of the car. This characteristic of movement has made the digital proportional radio control system the principal type in use today.

2. THE NUMBER OF CHANNELS— THE NUMBER OF CONTROL OPERATIONS

The number of channels of the radio control system indicates the number of



operations to be controlled at a time. A four channel digital proportional system will employ four servos to control four different types of action. The radio controlled electric car is basically designed to be controlled in two ways, speed control and steering control; therefore, a two channel radio control system is to be employed. In the present market, radio control sytems are available with up to eight channels. The two channel type, though the most fundamental, is enough to control cars, tanks, boats, and gliders, except gas powered model airplane (which usually require over three channels).

3. ABOUT RADIO FREQUENCIES-STATUTORY BANDS FOR RADIO CONTROL

Radio waves are used very widely in the society and are very important for medical emergency, police and military, let alone radio and TV broadcastings. If these radio waves should be interfered with, obvious problems could develop. Therefore, specific frequency radio waves for different purposes are regulated to be handled by qualified personnel for the purpose of avoiding disorder. Thus a number of frequency ranges are designated for model radio control, and any other frequency ranges than the allocated ones should not be used under any circumstances.

4. FREQUENCY BANDS

This phrase "frequency band" is used to denote the frequencies of radio waves. A receiver of the radio control system will accept signals emitted even from another transmitter, if the frequency used happens to be the same the servos will also be put in motion. In other words, radio control systems on the same frequency will respond to each other, thus causing them to go out of control. However, a number of radio control systems all using different frequency bands can control many models. Hence, it is recommended to employ radio control systems with dispersed frequencies to avoid interfering with each other when organizing a new racing event.

5. SAFETY, REGULATIONS AND OPERATIONAL BEHAVIOUR

Some radio controlled models of airplanes, racing cars and boats powered by gas engines can achieve speeds of over 100 km/h. It can cause serious trouble if they should lose control in the midst of operation; it might involve personal injury. Even electric radio controlled cars can attain speeds of 30 km/h. Be sure to abide by the rules stated below and be careful not to endanger or annoy others:

- ★Do not use the streets for running model cars.
- ★Do not operate near children or in crowds.
- ★Avoid radio interference.
- ★Inspect your transmitter, receiver and models prior to operation.

RADIO INTERFERENCE IS DANGEROUS

Signal waves of radio control systems sometimes reach about 2 kilometers in the air and over 300 to 500 meters on the ground. When there is another person operating a radio control unit, compare the frequency of your radio control unit with his. Avoid the possibility of interference; operating radio control units of the same frequency will inevitably result in interference and get your model out of control. In such a case use an alternate frequency if possible.

All models will be interfered with so long as frequency bands are the same.

★In radio controlled models, the fixed frequencies are used commonly among cars, airplanes, boats, and any other kind of model. So radio interference will occur so long as the same frequency is used regardless of the difference of types of models. Radio signals from other types of radio control units will interfere with your radio control model.

CHECK ON INTERFERENCE

A device called a "monitor" can be used for detecting radio interference. There is another simple way: move your transmitter away from the model to some distance, and watch the response of your servos. If the servos move strangely, interference can possibly be recognized. While operating your models, if you recognize any sign of interference, stop running and check the cause.

6. POWER SOURCE

In most cases, two different batteries are necessary for the radio controlled electric car: one is for operating the radio control system and the other is for driving the car motor. For the radio control unit, about 12 UM3 (AA) size dry batteries are used in most cases.

HOW TO SELECT AN ELECTRIC SOURCE FOR POWERING CARS

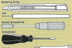
Nickel-cadmium batteries can be used for the power source of radio controlled electric cars. There are two types of nickel-cadmium batteries: one is a package type and the other is an individual type which has the same shape as dry batteries. Dry batteries are cheaper in cost, but not economical since they are thrown away after complete discharge. Also in performance, dry batteries cannot power the car as fast as nickel-cadmium batteries do. It is recommended to use nickel cadmium batteries for operating a full fledged radio control model for greater running time.

TAMIYA Ni-Cd BATTERIES

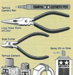
Tamiya Ni-Cd batteries are developed in conjunction with the Sanyo Electric company who is a leading manufacturer of Ni-Cd batteries. Tamiya's Ni-Cd batteries utilize Sanyo's original tab-less system for obtaining the maximum current flow, resulting in more powerful acceleration and higher total performance. If the battery is handled correctly and cared for, it can be recharged more than 500 times, making it very economical, even though the initial purchasing price might have seemed expensive when compared to dry cell batteries. For the running power source of R/C models, Tamiya provides a wide range of Ni-Cd batteries to suit all purposes. 6V-1200mAh batteries, large capacity 6V-4000mAh batteries used for giant R/C models, hump type 7.2V-1200mAh batteries that have the same length and width as the 6V battery, flat type 7.2V-1200mAh Racing Packs for competition use, and for those seeking more power, 8.4V-1200mAh Gold Power batteries are available. In addition, there are the 7.2V-270mAh Tampack batteries for 1/24 Tamtech cars, and 6V Mini Packs for R/C units. 6V, 7.2V and Tampack quick charger units are also available.

NECESSARY TOOLS AND GLUE

Not many tools are required so long as you assemble a kit as is. The necessary tools are illustrated below. Tools especially in need are included in the kit, or at least an explanation about tools is given.



Handy tools if available are side cutting pliers (radio type and ordinary types), screwdrivers, diagonal cutting pliers, files, vinyl tape, awls, oiler, glues, cutter, liquid threadlock, box drivers for 3 mm or 4 mm nuts.
Some specific tools we recommend are the No. 2801, Side Cutter for snipping wires or removing parts from plastic parts trees, and the No. 2802, Long Nose Pliers for holding items during assembly and for tying wires. The No. 2803, Angled Tweezers, or the No. 2804, Straight Tweezers make picking up small nuts, screws or other tiny parts much easier.



●GLUE

As for glues, the following three kinds are adequate for assembly: plastic glue, instant glue, and synthetic rubber cement. Some model kits include a tube of glue; on top of that liquid plastic cement is quite useful. Instant glue is used, for example, to fix a semi-pneumatic tire to the wheel, and synthetic rubber cement for a sponge tire to the wheel.

★Be careful when using instant glue, since it has strong adhesion, requiring only a moment to dry. Therefore, it is dangerous to have it in the eye or on the skin.

●LIQUID THREADLOCK

Synthetic rubber cement can be used for locking bolts and nuts but "liquid threadlock" works better for keeping bolts and nuts from getting loose.

●OILER

It is a must to oil the gearbox, shaft, and bearings. When oil is insufficient, it causes lowering of performance, and more serious trouble such as seizure of shafts. Spray type oilers are also available on the market today which are very handy for upkeep of radio controlled model cars.

●FINISHING

Any plastic paint can be used. Spray type paints are convenient for finishing larger areas such as bodies. For painting details like doll face features, paints for brush application are available.

●PLA-PLATE, POLYSTYRENE SHEETS, PLASTIC PUTTY

Pla-plate is plastic sheet of the same material as plastic kits. It can be expediently used for creating your own designed wing to the car and for reinforcing bodies and so forth. Putty is handy for mending scratches and small cracks which are often found after remodelling kits. Several kinds of plastic putty are sold at the market.

ADVICE ON SELECTING TAMIYA CAR KITS

Electric R/C cars are generally available in two sizes, either 1/10 or 1/12 scale; 1/12 scale cars are the most common of the on road track style, such as the 5842 Porsche 956, the 5849 Toyota TOM'S 84C, or the 5852 Newman Porsche. These cars come with 540 type motor except for the 5842 which come with the RS-540SD Black Endurance motor. With polycarbonate bodies, lightweight fiberglass chassis plus chassis damping and springs, these cars are intended for high speed road course races and are fast and maneuverable. 1/10 scale off road buggy racing is one of the most popular R/C sports anywhere. Tamiya has a wide range of off road cars to suit all types of modelers. Below we have listed the groups of different cars and the features each provides. For more information on the different cars and specific details, please refer to the latter pages in this guide book. For those on a tight budget, who want an easy kit to assemble, and want a car that is easy to drive, we recommend the 5838 Subaru Brat and the 5843 Grasshopper. These kits feature high strength engineering plastic chassis, high impact plastic bodies, spring suspension and the 380 type electric motor. The smaller 380 type motor permits slower speeds for the novice to learn R/C driving techniques easier and with longer running time as well. As the beginner becomes familiar with his vehicle, he can add more powerful motors such as the 5023 540 type the 5189 Black Motor Sprint, the 5225 Technipower or the 5230 Technituned motors for greater speed. Adding the 5073 Ball Bearing Set, the 5193 Adjustable Racing Shocks or the 5224 High Performance Suspension Kit for the Grasshopper will create more excitement for the driver as his skills improve.

Drivers who want a car that is quick off the line and is more performance oriented but who still must consider costs, we recommend the 5845 Hornet, the 5846 Fast Attack Vehicle, or the 5850 Wild One for fun or racing. All kits come with the 540 type motor for greater speed. the 5845 Hornet and the 5850 Wild One have oil filled shock dampers for better handling and realism. The Hornet and Wild One use polycarbonate bodies for resistance to damage while the Fast Attack Vehicle uses a high impact plastic body for greater scale detail. All of these kits use engineering plastic chassis for lighter weight and toughness on off road courses. Although well equipped, these kits can be changed for parts and accessories very easily. The 5841 Frog or the 5851 Fox represent the ultimate in two wheel drive action. These cars are performance oriented and the instructions are clear and straightforward so the kits assemble quite easily. The Fox features 540 type motor, plus ball bearing for lower friction and greater speed. Four wheel independent suspension with oil filled shock damping on the rear for the Fox are a must for tops in off road driving performance.

For all our thrills and high performance operation, four wheel drive racing is just the thing. The 5847 Hotshot and the 5854 Supershot four wheel drive vehicles fit the bill. The 540 type motor is standard, plus oil filled adjustable monoshock front end and rear double wishbone suspension equipped with stabilizers provide great handing. The 540 type motor drives both front and rear differential axles through a solid propeller shaft for minimum friction and maintenance and greater strength. The battery eliminator circuit in the Hotshot and Supershot replaces the normal R/C receiver battery to provide less weight in the chassis and greater top speed.

Enthusiasts who like to pop wheelies and want an all out stunt vehicle, the 5835 Wild Willy and 5844 Pajero are what you are looking for. These cars come with a 540 type motor for greater speed, high impact plastic bodies for greater scale detail, engineering plastic chassis for lighter weight and toughness on off road courses. The Wild Willy and Pajero are capable of doing wheelies very easily as well as spin turns and other stunts in addition to their ability to run on dirt tracks. Although well equipped, these kits can be changed for greater performance by using Tamiya spare parts and accessories very easily.

The kit of choice for the ultimate in scale realism is the 5848 Toyota 4 x 4 Bruiser. The large Mabuchi RS-750SH motor provides fantastic torque and speed through a preassembled 3 speed gear box. Two wheel or four wheel drive is also selectable through a four channel three servo R/C system (not included). The beautiful pickup cab and bed allow the modeler to detail his kit for the best appearance.

All Tamiya R/C cars are of the highest quality and are among the easiest R/C cars to assemble in any category and are supported by an excellent range of batteries, chargers, accessories and spare parts for long term enjoyment of the sport.

ASSEMBLY KITS AND COMPLETED MODELS

There are assembly kits on the market which you build up parts into a model by yourself and you buy a radio control unit separately and install it into the model, while completed or semi-completed models are available on the market, too. These completed or semi-completed models may be more economical, since in most cases they are equipped with a radio control unit from the beginning. At the same time they have such limitations as difficulty of disassembling, repairing, or transferring the radio control units into another model. So assembly kits can be recommended for enjoying radio controlling in a real sense. It is not a hard task to assemble kits, either.

READINESS OF PARTS AND COMPONENTS

Select model, the parts of which are easy to obtain. Tires and gears can wear out; even a speed control switch is an expendable component in a sense. Bodies and chassis may have to be replaced after some collisions. In such a case, your models can be mended easily and economically if the repair and replacing parts are available. For the Tamiya models, such components as a ball bearing gearbox and a more powerful motor are available for improving model performance according to a modeler's controlling skill. Spare parts and components for tuning up are essential to make fun out of radio control to a further extent, so choose a model whose parts and accessories are easy to buy at model stores.

HOW TO SELECT A RADIO CONTROL SYSTEM

The most popular type of radio control system for Tamiya cars is the 2 stick, 2 channel system. For beginners and even intermediate modelers, this type of system provides the most control and is lower in cost. Intermediate and expert modelers should consider the wheel control system for better performance. Instead of sticks for controlling steering and throttle, the wheel on the transmitter is used for steering while a finger trigger or thumb lever is used for speed control. In races, drivers will find their control of the vehicle to be smoother and faster. The wheel systems may cost more but they usually offer more features for easier installation and control of the R/C receiver and servos. For the special case of the 5848 Toyota 4x4 Bruiser, a 4 channel, 3 servo, 2 stick system is recommended for best use of this truck.

HOW TO CHOOSE BODIES

There are two kinds of model car bodies: clear bodies and hard bodies. The clear bodies are made of polyvinyl chloride or polycarbonate, featuring lightness. However, being vacuum-formed from rather simple molds, they are inferior to hard bodies in finish of lifelikeness and detailings, while hard bodies (plastic bodies) offer much more precision scale as they are manufactured by means of injection forming from exquisitely made molds.

POINTS IN PURCHASING

The assembly kit consists of numerous parts and accessories. So it is recommended to check up on the contents of a kit with a store attendant at the purchasing point. Also read through the assembly pamphlet to see how difficult or easy it is and ask questions, if any. Also you might as well inquire about the technical guidance and servicing by the store.

BEFORE ASSEMBLING YOUR KIT

Here are hints for easier construction of your R/C car kit. When you open your kit box, check your kit for completeness against the parts list in the kit instruction manual. Become familiar with the parts and their names so that when you begin assembling your kit you can follow the instructions easily.

As you begin to assemble the car, you should put small parts into a separate tray or small box so you can find them faster without losing them on your workbench. For example, put all parts for Screw Bag "A" into a tray and mark the tray with the complete label from Scew Bag "A" for easy reference. Do the same for small plastic parts and blister packed parts as well.

As you put parts together, test fit them into position before permanently assembling them. When the parts are test fitted, carefully compare how the assembly appears against the drawing in the appropriate assembly step. If the assembly does not look correct, examine the parts more closely. Did you use the correct parts? Perhaps you put the parts together in the incorrect sequence or backwards? Refer to the part numbers and drawings in each step closely to avoid such problems and take your time in assembling a kit in which you will take pleasure.

When you attach screws and nuts together, you can use synthetic rubber cement or Tamiya Liquid Threadlock to keep the screws and nuts from loosening due to shock while the car is running. Do not use other brands of threadlock because they will damage plastic parts connected by the screws and nuts.

TEST RUNNING HINTS

★Before installing the motor into its mount or a gearbox, it should be allowed to run freely in each direction of rotation for 15 minutes.

★Light grease should be applied to the teeth of the gears, and light oil should be applied to all axles and bearings. The oiling procedure is very important for sintered bronze bearings, also known as oiless metals. The oiless metals actually retain the oil for proper lubrication.

★Trim away all excess plastic flash from the nylon bushings, otherwise all axles and gears will not rotate smoothly!

★Make sure the motor pinion gear meshes smoothly but not too tightly with the gearbox. Check the pinion gear to avoid contact with any edge of the gearbox or cover.

★When the gearbox and wheels are assembled and the motor installed, the parts should rotate easily when the motor is powered by a single "D" cell. Make sure you perform this check!

★Before using your vehicle, we suggest you run the motor and gearbox in the vehicle with no load for 15 minutes to break in all the gears. (Example) You can put the vehicle up on the box with the tracks or tires above the ground to allow free movement of the gearbox.

VERSATILITY OF TAMIYA PRODUCTS

HOW BEST TO ENJOY RADIO CONTROLLED CARS

Speed race, gymkhana, drag race, and rally are the ways you can enjoy radio controlled cars. They are roughly classified into two groups by nature of races. In speed races and drag races, a number of cars start at a time to beat each other in time elapsed; and in gymkhana and rally, cars start one by one to compete against time. The Tamiya radio controlled electric cars will produce various speeds according to the kind of batteries employed. With that feature you can do a number of different racing events, depending upon the size of area, large or small.

Road course

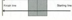
IN LARGE SPACES

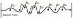
If a large open space is available, enjoy speed racing (heat racing). The road course (winding course like a circuit) and simple oval course are typical for use. In this kind of competition, the first to complete a certain number of laps is the winner. On the oval course, the lap race is also run, in which two cars start at the same time from opposite positions on the course, the one which catches up with the other being the winner. If it is difficult to make a road course for only one car, it is recommended to enjoy high-speed gymkhana. Set a course with obstacles of empty bottles or anything like that. The winner is determined by the time required to complete the course.

Lap race

IN LONG NARROW SPACES

Drag race

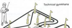


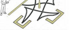

Slalom race

If the space is long but narrow, you can enjoy drag racing or slalom racing. In the drag race, the object is to cover a long straight way distance as quickly as possible. Since this is a simple race, maintenance of your car to attain high performance is of great importance. It may be fun to make a slope on the course which requires proper choice of gear ratio. The slalom race is an interesting variation of the drag race. Here cars start one by one and race against time through a number of pairs of empty bottles placed in various positions on the course so that they must take a serpentine zigzag path. Tamiya's radio controlled car will need a course only about two meters wide.

IN SMALL SPACES

You can enjoy Tamiya's radio controlled car even in a space only about 2 meters square. If the space is limited, it is recommended to race technical gymkhana. Make a course with many curves which need good control technique. The winner is determined by the lowest time required to run the course. Garaging gymkhana, backing gymkhana, etc., may be a lot of fun, too.


Technical gymkhana


Garaging gymkhana

RALLYING

In rally, the car which runs the course in the closest time to a certain fixed time is the winner. The same timing method as the rally can be employed to determine winners of other games. It is recommended to fix a target time after a few timings of trial runs along the course. Various rules can be established; for example, the penalty system is adopted for a time required over the target time, or in both cases of over or short of the target time. By changing a duration of a target time or conditions of a course, the game may be made more enjoyable.

HOW TO USE RADIO CONTROLLED BUGGIES

An off-the-road buggy race has a quite exciting fascination, a different pleasure than racing cars. Compete over a dirt course and cross country race to enjoy exciting driving.

DIRT SPEED RACES

Dirt speed races can be done in flat and vast areas such as a playground or a park. The course can be made in a simple oval course or a more complicated track with hairpin curves and figure "S" curves. You have to be careful since the surface of a dirt course is slippery. Advanced techniques of control are called for, but it is fun.

OBSTACLE RACES

In a place which does not have a very large open space, make an obstacle course. Utilize dents and humps on the ground. Along a curving course with ups and downs, a car will run in an unexpected direction and it is fun to drive cars on it. You can make it more interesting by spreading sand and pebbles.

Gentle undulating

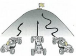
Obstacles such as pebbles

DIRT GYMKHANA

In a small place or when there is only one car, make a gymkhana course with empty bottles and drive a car through the pylons. By changing the arrangement of the bottles, a backward course may be made. Compete for time one-on-one.

HILL CLIMB

It is a slope ascending race. Any one which arrives at the top of a mound or a slope is the winner. Or you can contend for ranking by how far you can reach on the up-slope in a fixed time. A decisive factor can be the selection of a high gear or low gear combination, and to take a straight way or a zigzag path.



SPECTACULAR JUMPS

Thrilling jumps are another way of putting on a show with a buggy. Have take-off planks in your course. However, do not make it too high. Build a fairly long straight way before the plank to provide an approach run.

Run fast before jump

Do not make the take-off too high

Do not run the model car in the following places:

In a pebbly area or with a very bumpy surface, since the suspension system of the car may be damaged; or in a grass covered field, because grass blades may be caught in the car; also, not in a crowd of people or nearby children.

HOW TO ENJOY R/C TANKS

Tamiya model tanks are powerful enough to force their way over rough terrain and to climb obstacles. They will offer you the widest diversity of enjoyment. You are challenged to create various ways of racing with the Tamiya radio controlled tanks which can be made to move right and left, do gradual and pivot turns and, of course, go forwards and backwards.

ON LEVEL PLACES

The simplest slalom games can be enjoyed: Use empty bottles for pylons and run your tanks in the same way as your radio controlled cars. The first to complete the course is the winner. If a bottle is knocked down, one point is deducted from your marks. You can make the racing more interesting by adding slopes to the course.

IN ROUGH PLACES

It will be more fun for you to race powerful tanks on a rugged surface. Obstacles, such as boulders, steep slopes and trenches, can be made a part of the course. A rule could be made to lose marks when a vehicle goes off course or runs backwards. When a tank stalls on the course during a race, the driver is disqualified. The winner is determined by measuring the time taken to complete the course.

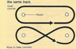
DRIVING TECHNIQUE

HOW TO IMPROVE DRIVING TECHNIQUES

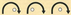
You cannot make yourself a skilled driver just by running a car at will. Make a course using things like empty cans as pylons.

BASIC TRAINING OVAL COURSE 1

This is the simplest course using two cars. It looks simple at first sight to drive a car along, but it will require some practice to achieve sharp and rigid turns made with the pylons as vertexes of the curves. Practice both ways, clockwise and counterclockwise, until you can make both rounds in about the same period of time. Figure "8" drill can also be done in the same track.

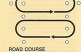


How to take corners



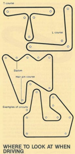
OVAL COURSE 2

Have two or three pairs of pylons forming gates and run your car through them as accurately as possible. You will find it much harder than the oval course No.1. For the first period of time, arrange the pylons at a wide space, narrow them gradually, then at last put them at a space of one meter. Practice in both rotations, clockwise and counterclockwise.



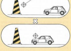
ROAD COURSE

When finishing course No. 1 and No. 2 you have mastered the basic driving techniques. Now you should proceed to complex courses. Build a road course with the pylons, from basic figure "T" and "L" courses to more complicated circuits, assortment of figure "L" and hairpin curves, high speed course and slaloms.



WHERE TO LOOK AT WHEN DRIVING

When you drive a car, it is important where you keep your eye on. Suppose the ovals described are in the field of vision. Put your point of sight on the forward part of the area of vision with a car placed at the rear. The car moves at a rate of 8.3 meters per second when the hourly speed is 30 km/h. With your point of sight on the car itself, you cannot keep clear of obstacles ahead, because it is too late to notice them; nor can you take corners easily.

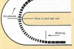


CORNERING TECHNIQUES

No particular skill is required for driving a car just straight, and the drag speed is limited by the car's own inherent performance capability. However, at curves, your finesse of taking corners affects the result even among cars of the same performance. Especially in speed races, the cornering technique is one of the decisive factors. After becoming accustomed to the car, try to practice smooth, speedy and stable cornerings.

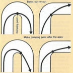
THE BASIC PRINCIPLES OF SLOW-IN AND FAST-OUT

"Slow-In and Fast-Out" is a golden rule in speed controlling at curves. And "Out-In-Out" instructs how to steer a car. Briefly, you should control speed in "Slow-In and Fast-Out" manner and steer a car in "Out-In-Out" way.



WHAT'S "SLOW-IN AND FAST-OUT"

Decelerating when entering into a curve and picking up the speed after a vertex of the curve is the technique. In the case of entering bends without reducing speed, the car is forced to slow down before finishing corners to lose speed and stability. In the worst cases, the car might spin or run off the course. It also gets the car moving too late to pick up speed. As a result "Slow-In and Fast-Out" is the fastest way to take corners.



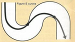
WHAT'S "OUT-IN-OUT"

It is, as illustrated above, a way of turning curves from the outside line of a course into the inside line to which the car will come closest at the vertexes (crimping points) and finishing the cornering approaching back to the outside line, thus making the longest possible turning radius. By utilizing the full width of the course, the car will make an easier turn than the actual curve. So the car may be allowed to run through it faster. As a matter of fact, however, it seems more advantageous to set the crimping point a little after the vertex, because it allows easier latter half cornering and enables the car more powerful acceleration into the straight course, in spite of sharper first half cornering.

★Both "Slow-In and Fast-Out" and "Out-In-Out" techniques are established from attaching more importance to velocity in the latter half of cornering than the first half. This has something to do with the acceleration of a car; that is, a car increasing speed faster than other cars at the latter half can take the lead in the successive straight track, provided the cars should have the same pickup and maximum speed capability. This principle is true anywhere except in a very wide road where you are not required to reduce the speed at all.

THE LAST CURVE IS THE MOST IMPORTANT IN A CHICANE

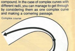
The last curve is the most important in continuous curves. In successive bends of a road, steer your car so that it will make the easiest turn at the last curve. Then you will be able to speed it up as soon as getting into the straight course.



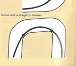
CONSIDER COMPLEX CURVES AS ONE

Consider complex curves as one integrated compound. In the case of complex curves with different radii, you can manage to get through by considering them as one complex curve and making a cornering passage.

Complex course



Curves with a straight in between

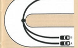


CURVES WITH A STRAIGHT COURSE IN BETWEEN

Even in the case of recurrent curves with straight tracks intervening, you could achieve a smooth cornering by counting them as one integrated curve.

DURING A PRACTICAL RACE, TAKE THE CLOSEST POSITION TO THE INSIDE LINE

Get to the inside lane while still on the straightway prior to the curve. The cornering technique explained is the ideal way when a car is running alone. In actual races, however, when several cars of almost the same capability are competing, naturally other racing techniques have been developed and are used. The most important point is to get the closest position to the inside line of the course ahead of the other competing cars. Here, as illustrated, the passage of car B is sharper than A's and car B will be forced to slow down, but with the advantage of a smaller radius, may be able to get ahead of car A by risking a spinout or being hit from behind by car A. It may block the other oncoming cars. Slower cars should yield the right of way to the faster cars.



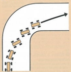
OTHER CORNERING TECHNIQUES

As for other cornering techniques, there exists four wheel drifting and tail sliding like real racing cars do. Four wheel drifting is a technique steering a little excessively at the early stage of a curve and letting all the wheels slide outside with the nose heading for the inside line of the course. In this way the car can get through the curve most quickly; however, it is difficult to practice. The tail sliding technique is to make the rear wheels skid while countersteering. This technique is not as stable as compared with the four wheel drifting, and it may not be fast enough to get through the curve, although it looks spectacular.

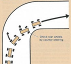
OPPOSITE LOCK STEERING

The word indicates to steer the wheel against the curve of the turn. If a car should go too fast on a curve, the rear wheels might start to skid, to counter the spin steer into the direction of the skid.

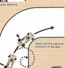
Four wheels drift cornering



Skidding cornering



Counter Steering



JAPAN AND SINGAPORE FRIENDSHIP RACE

RC ON-ROAD RACE IN CANADA

RC OFF-ROAD RACE IN AMERICA

MEMBERS OF RC TEAM HUSH-HUGGERS IN TEX.

WINNING RACES

IMPROVE YOUR DRIVING TECHNIQUE

1. PRACTICE AS IF YOU WERE RACING

After you have read and mastered "Driving Technique", the next step is to actually practice as if you were competitively racing. At the race you must compete with other cars for the checkered flag and your driving conditions are very different when compared with driving by yourself. Driving during a race can be very difficult, but can offer you more satisfaction and pleasure. In fact, you will never know the true feeling of R/C car models, if you do not race. Don't be satisfied with only practice running, but take part in races. It is essential that you gain as much experience and knowledge about racing as you can.

● Competition practice

A race is run with many cars at the same time. If you want to become familiar with racing, the best way is to hold practice sessions with your friends as a group. It is important to feel the difference between driving a car by yourself and competition racing. You'll notice that the track seems somewhat narrower with all those cars and it becomes difficult to steer the car on the line you desire. Experience is what counts to get your car ahead of the others. In addition, practice racing will teach you many things about quick starts, how to time passing other cars, how to avoid collisions etc.

● Change practice tracks

Do you practice your driving technique at the same place? You should change it sometimes. On-road races and off-road races are not always held at the same place. Surfaces of the track where races are held are much different from the surface on which you normally drive your car. In many cases, even though you drive and control your car perfectly during practice, running on unfamiliar surfaces can become a hassle with your car spinning out of the track. Practice driving on different surfaces is essential to improve your racing skills. Running on different tracks gets you tuning the car according to differing running surfaces, which in turn provides you with confidence and easier control.

2. RACING TECHNIQUE

Even if you believe you are experienced, it is difficult to display your ability to the full in actual racing. When several cars are together, the racecourse appears narrow. Your car is sometimes involved in an accident, and you may often fail to drive your car along the desired cornering line. To achieve good results in racing, it is necessary to acquire good racing tactics and technique.

● Sprint and long distance racing

Races are roughly divided into 2 types, according to the length of the race: sprint and long distance. In the real motorsport world, both races are very popular and numerous events are held in many countries all over the world. As far as sprint races in the world of R/C goes, the cars are raced from 3 laps to 15 laps, at most, without a battery change. Sprint racing is a flat out speed race requiring techniques that also become useful in long distance racing. First, you should start with sprint races. This will develop skills and experience for all types of racing. As you now know, the distance traveled in a sprint race is much shorter than in a long distance race, therefore, a very minor mistake can ruin your race, and recovering from that mistake and winning is going to be a very difficult task. Each competing driver is trying hard to get the utmost performance from his car, using his radio control skills and driving technique to take the checkered flag.

(1) Points in practice laps

In most races you will be given a chance to practice over the course, but you don't have to run the car very fast. What is important is to make adjustments by means of the trim levers and to gain knowledge of the track.

● Adjustment with trim levers

Practice is the last chance to make any necessary adjustment by running the car. Make sure the car runs straight and the speed control switch can be turned to maximum speed. If necessary, make fine adjustment by means of trim levers. If the switch contains a brake circuit, make sure that the brake works well. In adjusting the straight running of the car, it is recommended to run it directly away from you.

Adjust the straight running of the car by running it directly away from you.

● Knowledge of the race track

Course errors in racing must be avoided. It is important to do practice running along the course at least once. Particularly if you are on this track for the first time, it is necessary to run the car positively along the course in advance without hindering the progress of races, as well as to attend the drivers' meeting. It is advisable, if possible, to walk along the course in order to remember its intricacies and to note its condition.

● Confirming condition of track

The weather has an important influence upon the surface condition. It is not too much to say that tracks vary according to the weather on the previous day. You should confirm the track condition and decide in advance how to negotiate the main corners. Consider changing the tires, if you have time, according to the track conditions.

(2) start

The result of a race sometimes depends upon the start. However, a quick start is not always advantageous. Accidents are most liable to occur between the start and the first corner because participating cars are running close to one another. Decide how you should start according to the characteristics of your car, course layout, etc.

● When a quick start is advantageous

If you have confidence in the starting acceleration of your car and you believe it is able to out-distance others before the first corner, then you should choose a quick start. Also, if the distance between the start and the first corner is long, a quick start is advantageous. In this case, even if several cars have made a quick start, the distances amongst them gradually increase and, therefore, there is little possibility of collision on the first corner. A quick start is advantageous also when the distance of the race is short or when the course layout is intended mainly for speed competition.

● When a slow start is not disadvantageous

When you have tuned your car with a greater emphasis attached to its maximum speed rather than on its acceleration, it should be easy to make up for leeway on a straight even if you have made a slow start. In a long-distance race, you don't have to be very nervous about the start. Also, if the distance between the start and the first corner is short, it is advisable to make a slow start to avoid collision on the first corner.

(3) Pace Setting

● Whether to run ahead or behind a rival

Some drivers prefer to run ahead of their rival rather than behind him, whilst others prefer to be in pursuit. They have their own pace setting in races. The former drivers direct their energies particularly to the first half in order to take the lead from the beginning. Drivers of this type need to employ tactics so as not to be passed by their rival. They should avoid leaving a gap on the inside of a curve where they could be passed. Note that if a driver brings his car into contact with any other car on purpose, he may be disqualified from the race. The latter drivers, on the other hand, make a slow start, pursue their rival steadily and wait for him to drop out of the race or try to pass him later. Drivers of this type aim at constant performance. They must be able to pass their rival whenever they get a chance. It is good advice to follow close behind your rival's car hoping to cause him to commit an error and thereby getting a chance to overtake him. Decide whether to be ahead or behind your rival, and employ suitable tactics.

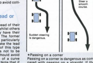
● Take and hold the inside line during cornering.

When competing with your rivals during cornering, take and keep the inside lane for maintaining the lead. It is difficult for you to beat your opponent in the corner by trying to pass him on the inside line because both cars are running at about the same speed. If your car can manage a higher maximum speed than the others, only then, is passing on the outside line possible. Trying to take the inside line too early can lead to over-running the corner resulting in loss of time and running space for your car. While you're at the edge of the track, your rival can easily pass you on the inside. In order to avoid this, stick to the inside, forcing him to delay his acceleration. Taking and holding the inside line in the corner is a golden rule for taking the lead at corners. Confrontation between cars during cornering are the most exciting moments during a race, but be sure to avoid the selfish type of running that can cause collision and damage that will spoil the overall race for everyone.

● How to pass others

★Passing on the straight

There are various places in which you can try to pass another car. A straight is the safest place to do so. It is dangerous to start passing a car when you are following close behind it. When you judge it is possible to pass, steer your car a little as soon as possible and attempt to pass. You may pass on either side, wherever there is more room. If the space on each side is about the same, it is advisable to go inside to make the next corner easier to negotiate.



★Passing on a corner

Passing on a corner is dangerous as compared with passing on a straight. If the driver of the car you are going to pass is not skillful in control, your car is liable to be involved in its spinning. To make passing easier, it is advisable to go inside the rival's car and pass it after turning the corner. It is very difficult to pass it on the outside of the corner even if your car is much faster.

If your car has hit another car and lost its stability, then reduce the speed by turning off the speed control switch. If you try to restore stability by steering, the car must be further disturbed. Start acceleration again only after the car has slowed down and is stable.

On the track

With the exception of a plain oval track, typical road racing course is made up of straight stretches and numerous turns that test your radio control driving skills. Before going onto the track to race, look it over carefully with the potential of your car in mind. If your car has power and high maximum speed, you should put extra driving concentration on the straight stretch, and if your car has less power but superb handling, you should concentrate your driving at corners. Taking the inside line quickly and swiftly at each corner will enable cars with less power to take the lead. On the other hand, cars with high output should fully accelerate at the end of the corner to obtain the utmost speed in the stretch. Know your own abilities and the track. Know when to use maximum power and when to concentrate on handling. Study the track thoroughly and decide what part of the track requires your utmost driving ability. Running at your limit all the way will only let you spin out of competition.

(4) Pace setting for each heat

Currently, sprint racing is very popular among R/C car enthusiasts. Usually these races consist of 2 to 3 racing heats to determine qualifiers for the finals. Each qualifying heat has from 3 to 5 laps of racing and the finals will have from 7 to 10 laps of racing. Set your own pace for each heat to obtain the best results your skills can offer.

First heat

It is impossible to foresee what accidents or trouble will occur in your race. If you damage your car in the first heat by overtaxing it, perhaps you may not be able to achieve a good result in the end. Steady running is the key to success. Use the first heat to verify that your car is handling correctly and running smoothly, and just endeavour to complete the race. Never overtax the car. If it fails to finish, there is little possibility of being allowed to run in the final.

Second heat

If you run the first heat steadily, you can try your best in the second heat. To obtain a better result than in the first heat, use all your skill and employ more aggressive cornering techniques. If you did not obtain a satisfactory result in the first heat, you may stake your all on the second heat, but you must not drive recklessly. You should refrain, as far as possible, from using tactics that might cause an accident.

Final race

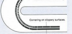
Being able to take part in the final race already means that you are a qualified driver. Show ability to the full in the final race. From the results in the first and second heats, you can guess your ranking among the finalists. If your ranking seems low, endeavour to raise it, even a little, without aiming at victory. If you seem to rank high among the finalists, you should try to win. As you are capable of winning, or at least a good place, be careful not to be involved in a stupid accident. Always do your best.

3. DRIVING ACCORDING TO RACE TRACK CONDITIONS

There are various track surfaces; asphalt, concrete, wooden boarding, vinyl tiling, etc., and they all have different characteristics. Practice repeatedly so that you can control the car on any kind of surface. Generally speaking, asphalt or concrete tracks are not slippery because they are rough and have a high coefficient of friction. Wood, vinyl-tiled or cement surfaces are smooth and slippery. Note that even asphalt race tracks are slippery when they are wet or covered with fine sand or dust. It is possible to gauge the track condition by eye, but it is very important to confirm the difference of the surface from your usual practice ground by making a trial run.

Quick acceleration, quick braking and quick steering are taboo on slippery surfaces.

On slippery race tracks, the grip of tires is very small and the stability of the car is disturbed very easily. Quick acceleration is taboo even at the start, because the rear wheels (driving wheels), whose tires have little grip, are liable to spin and the car may slide even when it is turned only slightly. Be even more careful in deceleration. If the car is quickly decelerated, the load of the car will move forward by inertia, (in other words, the center of gravity will move forward), and the load on the front wheels will increase while that on the rear wheels will decrease. Therefore, the grip of the rear wheels will become much less and they will skid very easily. Deceleration must be made as slowly as possible. Never brake the car quickly when it is running at top speed.

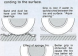


Cornering on track with good adhesion.

Reduce speed sufficiently before cornering. In cornering, the car is subjected to centrifugal force which pulls it outwards. It is because the centrifugal force is greater than the grip of the tires that the car is liable to spin or run out of road on slippery surfaces. The centrifugal force increases in proportion to the speed. Therefore, it is necessary to decrease the centrifugal force by reducing the speed and making the turning radius as large as possible. Needless to say, quick acceleration and quick braking are taboo in cornering. Reduce the speed sufficiently before entering the corner, and increase the speed after completing the turn. It is a cardinal rule that the cornering line should be "out-in-out" so as to make the turning radius as large as possible.

4. CHOOSING TIRES ACCORDING TO TRACK CONDITIONS

The tires have a great influence on the performance of the car. Even when the surface is slippery, it is possible to reduce the chance of skidding by using suitable tires. Many people use sponge or pneumatic rubber tires. Use either of them according to the surface.


Sand and dust behave just like ball bearings.
Grip is lost if water is sandwiched between the tire and surface. "Aquaplaning."
Effect of sponge tire.
Better grip is obtained because the tire has better adhesion on an uneven surface.

Sponge tires

Sponge tires are suitable for asphalt or concrete tracks. They are softer than pneumatic rubber tires, and adapt themselves better to the track surface. Therefore, on asphalt, etc., with fine grain, they grip firmly. However, on smooth surfaces, such as wood boarding, they are inferior.

Pneumatic rubber tires

On smooth tracks, such as wooden boarding, the pneumatic rubber tires may offer better grip. The same applies to wet tracks. On wet surfaces, sponge tires are liable to slip because they absorb water, although this depends upon how much water is present.

★ By utilizing the different tire properties, it is possible to change steering characteristics such as over-steering and under-steering.

Spike tires

Excellent for good grip on soft soil surfaces. Spike can really dig in. The tires have spikes molded onto the tread surface. The spikes help the tires get the best traction on loose surface running, improving acceleration and handling of the car. The spike tires though, have disadvantages of wearing faster, and a car with spike tires can experience a roll-out when running through paved corners and on lawns due to weak gripping on hard surfaces. Spike tires are strictly for off-the-road chores.

Block pattern tires

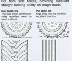
Off road surface gripping for block pattern tires is not as great when compared to spike tires, but can cope better with differing running surfaces. Block pattern tires with tall blocks molded at wide intervals provide good grip, and have a better wear factor than the spike tires when run on hard surfaces. Consider it when the track has both hard and soft surfaces.

Lug pattern tires

The tread pattern on these tires are molded laterally, and can be often seen on jeeps and trucks. Also there are the so called "Sand tire" or "Paddle tire" that belongs in this grouping. These tires have the large blade patterns seen on water wheels and molded on fat balloon tires. These help the car over soft sandy terrain without digging in and becoming stuck. The lug pattern tires provide good traction, but have less gripping perseverance to G-forces.

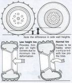
Rib pattern tires

These tires have a lengthwise rib pattern molding, and are often fitted to the front end of off road going cars. The lengthwise ribs and grooves help the car maintain its grip and control from side forces, providing excellent straight running ability on rough roads.


Oval block tire
The oval block pattern provides excellent wear on hard surfaces.
Pin spike tire
Digs deep into the earth for excellent traction.
Lug pattern tire
Rib pattern tire

Low height tires

Also called the "Low profile tire", these tires feature lesser side wall heights than the others, and provide firmer grip on tight corners due to less deformation of the tires during G-forces. Larger wheel and less tire when compared with other wheel and tire combinations, which leads to weight saving. Low side wall means stiffer tire characteristics, and thus less shock absorbing is done by the tire. Therefore it is important to keep the suspension unit maintained to accept those extra bumps on the trails.


Low height tire
Normal tire
Note the difference in side wall heights.
Low height tire
Provides firm grip on tight corners due to minimum tire deformation.
Normal tire
Proves to be flabby when compared with low profile tires.

GUIDANCE TO PARTICIPATING IN RACE

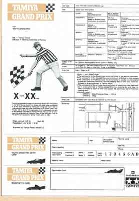
Today the radio controlled electric car races are often held in many places promoted by manufacturers and hobby stores. Participate in the official competition when you get used to operating model cars to some extent. If you attain a good score, you will gain confidence. Even with poor grades, you will see better modelers operating a car which is most likely of better performance and helps you to improve your own control technique and your model. You will also find a different kind of delight other than playing with models among just your friends.

1. APPLICATION FOR PARTICIPATION

Schedule of races may be announced at the hobby stores or in the magazines. It is mandatory to enroll yourself in the contest roster; in most cases you cannot apply to an event on the very day. You are required to give the class and kind of your car and frequency you will use, besides your name and age.

2. CONFIRMATION OF RULES AND REGULATIONS

Rules of racing events usually tell you how the race proceeds, how to determine the winners, how to group the models, kinds of motors and batteries to use. Sometimes detailed regulations are provided to regulate the standard equipment of racing cars. Confirm these rules and regulations beforehand with your car, and remodel or modify if necessary for compliance. In official competition, car inspection will be done at the registration area on the day to see whether or not your car is qualified. Of course, a disqualified model is rejected for competition. Therefore, if there is any point you don't understand in the rules and regulations, you should check it with the host organization.



TAMIYA GRAND PRIX

X th TAMIYA GRAND PRIX

Site = Tamiya Circuit
Officials = Steering Committee of Tamiya

X month XX day

When rain put it off to April 29.
Registration: AM 8:00 ~ 9:30

Promoted by Tamiya Plastic Model Co.

Car Type: 1/12, 1/10 radio controlled electric car

Item: Speed race time system

Entry Fee: Free = Open to all

Guidemap

TAMIYA GRAND PRIX

TAMIYA GRAND PRIX ENTRY CARD

Name	Age	Occupation School Grade	Team's name
One's dwelling			Mail No.
			Phone
Participating race name: Freshman 1 Freshman 2 Senior 1 Senior 2 Expert Masters		Use's band 1 2 3 4 5 6 A B	
Maker's name		Retail Store	

TAMIYA GRAND PRIX

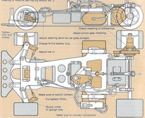
REGISTRATION CARD

Registration Card

TAMIYA

3. CHECK OUT THE CAR BEFORE THE RACE

Drawing of Porsche 956 Racing Master Mk. 5


Check meshing of differential.
Adjust pinion gear meshing.
Tighten nuts and screws.
Adjust steering servo so car goes straight.
Charge Ni-Cd battery fully.
Adjust toe in.
Make sure of switch contact.
Fix battery firmly.
Round corner of sponge tires.
Make sure to connect connectors.

4. PREPARATION BEFORE THE RACE

Get your car ready for the race by the previous day. The most important is the radio control system, since you are required to place the transmitter in custody of the host organization. Namely, you cannot tune it up on the competition site after registration. On top of that, gear meshing, screws or bolts and nuts, shaft and tires should be carefully looked over ; repair or replace with new parts, if necessary. Of course, oil all the rotating parts. If you find batteries are low on power, replace them or charge them fully if rechargeable.

5. THINGS YOU MAY NEED AT THE RACE TRACK

It is needless to say to take a registration card or membership card with you, if anything like that is required. Be sure to bring tools, glue and oil which you use every day. Sometimes you have to mend your car even in the midst of competition. Do not forget to bring fragile parts and accessories which are easy to lose such as screws and bolts. It is advisable, in regards to the length of time of the event, that spare batteries may be recommended to have for caution's sake.

6. REGISTRATION AND CAR CHECK

Leave your home for the race site with ample time for arriving early for registration. Your delay for the registration may upset the whole schedule and annoy others. Very often registration and car check are conducted at the same spot. Undergo the registration desk, you may be given a contest number, perhaps marked on a pennant. During the whole event, you may be referred to with that number when being called or receiving your transmitter; so remember this number. Car check may be done after the registration. Your car will be examined with batteries on board. Even if your car should be disqualified, you might be admitted provided you could repair or modify your car on the spot in accordance with the rules of the organization. After the car check, you are called to hand over your transmitter to the officials. Be sure the switch of the power source is off before handing it over. The reason why transmitters should be impounded by the organization is to avoid interference by intentional or unintentional signals during the races. If a receipt for your transmitter is issued out, do not lose it; sometimes the pennant is used as a receipt to retrieve your transmitter.

7. BRIEFING FOR DRIVERS

Prior to the races, a briefing is held for letting the contestants know the procedures of the competition. Listen carefully, since how the races proceed, penalties for violating rules and other important affairs are explained.

8. MAKING UP A RACING GROUP OR CLUB

In a radio controlled model race, cars on the same frequency cannot compete at the same time. Therefore, those who use different frequencies will make up a competing group. Before the races the combinations of the groups are announced. You should confirm which race you will be in. When time is getting close to your turn, prepare yourself for the race.

9. JUST PRIOR TO YOUR RACE

Your name or number is called to inform you of your turn. Receive your transmitter according to the official's direction; switch on both your transmitter and receiver in the car. Move the sticks of the transmitter and see if the speed control switch operates properly and the front wheels turn firmly right and left.

10. PRACTICE LAP

If you have time to make a round before the race, run your car along the course. There is no need to rush it, but drive leisurely and become familiar with the course. The most important matter is to confirm that the car goes straight on the straight course. If not, adjust it with the trim lever of your transmitter.

11. RACE

Now is the time to start; countdown has begun; try not to be hasty. Be particularly careful not to make a premature start. The first curve right after the starting section is the place where collisions occur most frequently. So drive your car prudently. The point is to keep your coolness during the race. Vying with other cars and taking corners at great speed will most likely result in spinning or sliding off the course. A rule you should keep in mind is to drive your car at your own speed calmly. When you pass another car, try not to hit it from behind. Also, it is etiquette not to hinder a faster car when being passed. During the race, priority should be given to completing the course. Try to finish all the laps designated without any accident.

12. AFTER THE RACE

You have run the complete distance and the race is over. Switch off your transmitter and receiver immediately and return the transmitter to the officials. Although you may be anxious about the result, do not stand around the finish line, as you may be in the way of the officials. Get back to your seat and check your car, preparing for the next competition.

13. ANNOUNCEMENT OF THE RESULTS AND COMMENDATION CEREMONY

After all the races are complete, the results are posted and the winners are honored. The winners should be praised by applause. Whether or not the competition is successful depends upon the attitude of everybody involved.

14. RETURNING OF TRANSMITTERS

Lastly, your transmitter is returned to you in exchange for a receipt. It is a serious breach of rules to pick up your transmitter from custody during the contest without permission. If you have to leave the site before the races are over, you must explain it to the official and get your transmitter returned by him. In such a case, you must keep the transmitter switched off until you are sufficiently away from the race site.

TYPES OF RACES

- **TIME RACE**
- **POINT SYSTEM RACE**
- **LAP RACE**

These three are typical types of races. In the time race, the winners are determined by the time required. In the point system race, points are given according to the ranking of each heat, and the total points make the final record. In the lap race, the number laps a car can make in a certain time decides the winners. Of these, the time race is most common. Sometimes a preliminary game is done by a time race, and the outcome is determined by the order of arrival to the finish line.

MANNERS IN RACE

Spirit of fair play is essential in any game. It is desirable to make a pleasant race event through the fair play spirit of all the participants.

- ★Transmitters are kept by the host organization without exception.
- ★Transmitters in custody will not be taken out unless passed by the officials.
- ★Yield the way when you are about to be passed by a faster car.
- ★When you hit another car, you should apologize. But do not ask for one after being hit. Responsibility should not be claimed by anyone for any collisions during a race.
- ★After all the races are over, clean the site. No rubbish should be left behind.

STARTING SCENE, AMERICA

AWARDS CEREMONY, ITALY

THE FINALS, ITALY

R/C CAR RACING AUDIENCE, ENGLAND

DRIVERS PARTICIPATING IN OFF ROAD RACING, ITALY

THE CHALLENGE OF LE MANS

LONG DISTANCE AND ENDURANCE RACES

The Le Mans 24 hour race is done with racing sport cars, and the famous Spa-Francorchamps 24 hour race is done with touring type cars. A combination of driving ability and team-work of the pit crew are necessary for winning this type of race. Fuel (batteries); tire changes and the correction or replacement of broken parts is essential from the pit crew in the minimum time possible to remain competitive. A R/C long distance race should be conducted over a period of at least one hour, and the winner is the vehicle that completed the most laps during the period. Recharging batteries, assembling required spares and changes in the steering and gear ratios are only some of the things that might need to be accomplished during the race. Driver fatigue can also be an important consideration during the race, and changes of drivers should be anticipated during a pit stop. The fastest car on the course is not necessarily going to be the winner. The car that maintains the best total average over the entire race is most likely going to win. Prior race planning and completely understanding the limitations of your vehicle, as to battery duration and speeds over the circuit can give you the edge for winning long distance races. The challenges of long distance racing are completely different from those of sprint races.

THE TORTOISE AND THE HARE

●About "Speed" in long distance racing

In any long distance race, you cannot say for certain that the fastest vehicle is going to be the winner. We are all familiar with the saga of the Tortoise and the Hare. The Turtle was far slower than the rabbit, but won the race by keeping a steady pace throughout the course. Maximum acceleration and high top speed are not that necessary in long distance racing. If you have a very high performance car, tuned up to its capacity, and attempt to run a long distance race, you are likely to spin out often if you are initially concerned with leading the pack at the races outset. Fast acceleration and a high top speed utilize a large current flow from the battery, thereby requiring more pit stops for battery changes. Long distance vehicles also require a greater degree of precision tuning, better maintenance, and durable parts, and perhaps a different gear ratio. The vehicle that makes the fewest pit stops will most likely be the winner.

CARS FOR LONG DISTANCE RACES

●Credibility & durability are the first requirement

In full sized car racing, the machine used for long distance racing has less high speed performance than a racer for sprints. This is done so that the vehicle will last the entire race, and not become disabled prior to the finish. In radio controlled cars for long distance racing, the same is true. A car made from a kit properly will have this durability and be competitive during the entire race; however, if it is not built and assembled accurately, the chances of it surviving a race is slim. You must make sure that all screws and nuts are tightened firmly and where required, that liquid thread lock is applied to the threads to prevent loosening. It is recommended that all electrical wire splices be soldered, to ensure a good positive electrical contact throughout the race, and that the wiring is tied down firmly to prevent it from becoming entangled in drive gears etc. Prior to the race, use new rubber bands and replace the doubled sided servo tape with fresh tape. A car that is lighter in weight will move faster; however, by lightening the chassis by drilling holes in it, or removing some bracing, you may find you are faster, but the car will not last the race because it is no longer durable. Credibility & Durability are the keys to winning long distance.

●Pit practice and maintenance for victory

The majority of pit work during the race will be battery changes. By saving time during these stops, you can greatly advance your standing in the race. It is very necessary that your crew practice removing the body, change batteries, replace the body and secure it on the chassis. The more this is practiced, the quicker they will be during the race. One second saved in time is a gain of one second on the leader, and races are won and lost in less time than a second. During the race it is necessary to be calm during pit stops. If you are in too much of a hurry you could make mistakes that delay getting back into the race, such as misplacing clip-pins for the body, failure to connect up the battery properly. Practice, and more practice is the key in saving time. Also be prepared to replace motors, wheels and tires during the race. If you use plug type connectors to the motor it can be replaced quickly if necessary. The same is true of the speed controller. Make it easy for your pit crew to keep the car on the track.

●A powerful motor is not always profitable

A large, powerful motor is a necessity in sprint type races where no battery changes are needed; however, the same does not hold true for long distance racing. Small motors which use little electric current are much better as they require fewer pit stops for battery changes. As an example, the 540 type and 380 type motors are representative of motors used in radio control racing. The 540 type has a torque of 200gcm; RPM 11,000 and draws current at 6.25 ampere. The 380 type on the other hand has a torque of 75gcm, RPM 12,800 and draws 2.9 amperes. This information shows that the 540 type motor produces more than double the power, but consumes also twice the current. A car using the 540 type motor will require many more pit stops for battery changes than one using the 380 type, and even though the car will be somewhat slower on the track, it will still be running while the former is in the pits for battery changes. Another point to consider, is that with the high current flow of the larger motor, the speed controller is more apt to cause trouble, and in any collision, the faster car is normally damaged to a greater extent because of the higher impact forces. A faster car is also more tiring to drive during long races and mistakes in driving are more likely to happen due to the speed at which it is traveling. All of these considerations must be taken into account when selecting a vehicle and motor for long distance racing. A good rule to follow when working up a vehicle for endurance racing is to use a smaller motor for those tracks which have many tight corners and fewer straight runs, and use a higher performance engine with higher gearing for those tracks with long straight runs and less complex curves.

●Strong torque and high top speed and large current drain

●Better current drain with correspondingly less pit stops.

LONG DISTANCE RACING DEPENDS UPON TEAM EFFORT

●Organizing a racing team

You can, of course be the driver, pit crew, and run an entire long distance race by yourself; however, you will not be overly successful very often doing this. Best results are obtained with a driver, mechanic for battery changes, repair and adjustment, time keeper who records and times the laps, and a team manager who guides the team. Long distance racing can require more than one driver, so it is best if all team members are also drivers.

●Team work gives the edge to your car

Once the team is formed, the next step is to get it working together. Firstly, all members must know and practice the role they are to play. The driver must run the car according to the team manager's instructions. It disrupts the team work when a driver struggles against other cars following his own selfish interests, or delays a pit stop etc. The mechanic is constantly preparing the batteries for changing, and keeping track of which are fresh and those in a discharged state. They look the same and in the flurried atmosphere of a race, more than one dead battery has been replaced by another dead one. He should be adept in quickly removing the car body for battery changing, and adjusting steering and changing tires etc. The time keeper plays an important role in-as-much as he records all of the fundamental data that the team manager uses to formulate his race strategy and tactics. At a minimum, he should record the number of laps run and the lapsed time from the beginning of the race. If possible, he should calculate the average lap time of the team's vehicle, time the pit stop and record what was done, plus keep track of who was driving and when a change of drivers occured. The team manager observes the progress of the other teams, and advises his driver as to pacing, pit stops etc. The team manager and time keeper should not be drivers in this race. During the second half of the race, when there is almost no difference between your car and the rivals team, it is the data provided by the time keeper that

will give the team manager the necessary information to guide his driver on to victory. It is the manager who is responsible for victory or defeat in long distance races.

● Periodic pit stop maintenance

The number of pit stops made must be reduced to the absolute minimum. If your only stops are for battery changes and/or driver change, then your race is progressing well. Keep in mind though, that it is also necessary to periodically oil bearings, and shafts. Polish and oil speed controllers, and to apply spray oil into motors and onto gears. This maintenance, although time consuming during a pit stop, must be done to prevent failure of a part due to lack of lubrication. Also look for any loosening screws and/or missing parts that may require maintenance during the next stop.

● Trouble pit stops

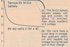
As soon as a problem is noticed by the driver, he should pit the vehicle the next lap. To keep running the car with a problem will only create a worse problem, and perhaps one that can no longer be repaired during the race. After a bad collision or spin out, observe the vehicle for a lap or so, and if there is a problem pit it as soon as possible. During the latter stages of a race, it is difficult to judge if your vehicle is performing the same as at the beginning. You must compare your performance with your rivals, and if your vehicles running compares favorably with your opponent, keep running it, even though you feel that its performance is not as good as at the beginning. If you make a stop and discover that it will take too long to repair the fault, continue running the vehicle, rather than expending the repair time. The manager's judgement on this must be accepted.

● Pit tools and spare parts

Keep the total number of tools in the pit to a minimum; however, make sure that you have all of the required tools to completely assemble the vehicle. A box wrench, for instance, is much better than an adjustable spanner. Needlenose pliers and tweezers are also required. If you take only one glue, the instant cyanoacrylate is recommended. Gummed tape, vinyl tape and soft iron wire are also very useful for making emergency repairs. Take along enough parts to completely rebuild the vehicle. Extra parts for the front-end and steering, and those parts that require assembly, should be assembled prior to the race, so that they can be installed as a unit, rather than part by part during a pit stop. Sponge type tires do not normally require replacement in races of two hours or under. Semi-pneumatic tires will require replacement two or three times. As for diplo tires, if the center rubber part of the tire is not firmly fastened, it may come off during the race. Wheels sometimes become broken, so even if you are using sponge tires, take along spare wheels on which you have mounted new tires, properly balanced and rounded off. Be prepared for anything that could likely occur. If you don't bring it, that's what will break during the race.

● Battery changing during races

One very important, (perhaps the most important) part of racing, is how long your batteries will last during a given time. Ni-Cd batteries have the ability to deliver a constant even voltage and current supply to the motor, until the battery is almost exhausted. If you are familiar with the circuit you will be racing upon, you already know how many laps you can get from your battery on that circuit, however, if you are racing on a different circuit, it will be guess work on your part to know how many laps you will get from battery. During endurance racing, where many battery changes are required, you must have the ability to judge when a pit stop for battery changing is necessary. Normally, you will bring the car into the pits about two or three laps prior to battery exhaustion. Running the car until it stops from lack of power is not good for the battery, nor will you end up winning any races that way. Tires, driving technique, course length, number of laps required, course condition, type of motor, all play a part in how long a battery will last. Be on the safe side and bring your car into the pits after you have run the battery down to its safe limit, by measuring the time or laps run. Make sure that your battery supply for the race is sufficient for the entire race, to include two or three extra batteries, for protection in case of an accident on the track, or battery malfunction. The smooth, steady driver, who makes the required pit stops on time, is the driver who will win endurance racing.



● Radio control battery life

Normally, you will not require a fresh receiver or transmitter battery during a race that is not longer than one hour, if you start the race with fresh batteries or recharged Ni-Cds. Note however, that the more servos you use, the more the receiver battery is used. Whatever equipment you use, you must be familiar with the nominal life expectancy of the batteries, and if there is a possibility of the race lasting longer than expected, prepare extra batteries beforehand, just in case they are needed at a pit stop.

TECHNIQUES FOR WINNING LONG DISTANCE RACES

Endurance or long distance races are very much like human distance racing. To win, you must establish and keep a steady pace throughout the race, avoiding useless deadheats with other rivals at all times. Keep clear of trouble on the track and run your car at a steady even pace.

● Start

You do not have to "Jack Rabbit" start. Take it easy and run carefully at the beginning, especially at the first corner, where accidents often occur. Enter the corner high, even if you are left behind at this curve. Accidents at the beginning of the race often leave the driver irritated and confused, and the original plan of pacing is lost. For the first two or three laps be very deliberate in your driving. You will start to relax, learn the track and how the others are pacing themselves. If you should spin out, don't become upset and dash to catch up. Keep the pace and drive smoothly.

● How to pass and get ahead of rivals

Success in long distance racing usually comes from not being in the lead for most of the race. When you are the front runner, you are always concerned about those who are behind you trying to pass. If you cannot maintain enough distance in the lead over your rivals, it is better to let one or two pass you, than constantly worrying about them. You can then use the leader as a pace setter for you, and when the time comes for you to pass, do it right after a corner that is followed by a long straightaway. Even if your car seems to be slower than others in the race, you still have a good chance of winning. Remember that the faster a car runs, the more battery it consumes, and the faster cars will have to make more pit stops. This is your chance to catch up and pass them. If you can just manage to keep your own pace, throughout the race, you have a good chance for the winner's trophy.

● Relax when cornering

During the endurance races, take the middle or high corner, rather than at the track inside edge. This is where many accidents occur, and those that are trying to catch up from their last spin out will be fighting for that inside lane, and most likely spin out again. If you are there, you could be knocked out in the accident. Stay high in the corner and relax, except for that time when you need the extra speed and dash for winning the race. Relax and win!

RECORD THE RACE

In long distance races, it is advisable to keep a record of the race. Later, you will be able to review it with your team mates and determine where time was lost. This is a very useful and positive approach to improve and strengthen your team for other long races.

● Pit records

This is the record of all pit stops of your car. Which laps the stops occurred, how long the stop was for. The reasons for the stop and what was done to the vehicle at each stop. Perhaps you only changed drivers and batteries, or perhaps changed tires due to new track conditions (rain; oil on track etc.). Whatever the reason, this information will assist you in making a better overall plan for the next long distance race.

● Race progress records

This is a record of the progress of the race, lap by lap. It will consist of the lap times, driver's name and any other information deemed necessary during the actual running of the car in the race. This information will provide you with planning data for future races as to which driver is best for certain conditions; number of laps expected during an hour of driving time; and number of pit stops expected.

● Lap record listing

This is the data which the promoter of the race records. The number of laps of each team is recorded every 5 minutes. From this record, the pace of each team is determined, and the progress of the race. He will know which car is ahead and also when another car takes the lead from a rival.

GUIDANCE FOR ORGANIZING A COMPETITION

LET'S ORGANIZE A RACING EVENT

It is a thrill to participate in a race; however, it is a more significant experience to organize a contest. A competition requires many people: timekeepers, course committee members, etc. In small races, such as those organized by hobby stores, players, often serve concurrently as officials. It will be appreciated if you can offer a hand as an official. It is not only welcomed by an organization, but it is also rewarding to yourself. The experience of taking part in a race meet as an official will surely help you with organizing another event. Moreover, it will be of much benefit to you when you participate in a contest as racer.

1. TYPES OF RACES

There are many types of races: series, single ones, and others. It is a common purpose to compete with fellow racers and to develop skills. The more races you participate in, the better results you can expect. Many races are organized in a series to compete throughout the year in order to single out a champion.

●POINT SYSTEM SERIES

Points are given to contestants in proportion to records achieved at each individual race. The winner, 2nd, 3rd places and so forth are determined respectively by the total points accumulated in the series.

●REPECHAGE SERIES (PRELIMINARY)

The big drawback of the point system series is that it is unfavorable to participants who join late. The repechage series has been organized for eliminating this drawback. For example, minor races are held every month to choose a champion of the month. The annual event is conducted to determine a champion of the year. Anyone who has become a champion of the month is eliminated from the following monthly events. In this way, a new champion (competent person to the annual final race) is chosen every month, and contestants from the middle will not be put at a disadvantage. At the same time, this system will give an opportunity to low scores to win a monthly race. Of course, the minor races can be held every week instead of every month and the grand championship can be held semi-annually. Though two types of series have just been introduced, the vital point of making a race successful lies in a consideration to disperse the chance of winning as widely as possible among all contestants.

2. QUALIFICATION FOR PARTICIPATION

●OPEN TO ANYBODY.
●SOME LIMITATION BY AGE.

These are two typical systems. It is usually common that employees or members of the host organization are not eligible, but they may be admitted under the condition that they are eliminated from obtaining awards and ranking.

3. ANNOUNCEMENT OF A RACE

It can be announced through posters. Handouts are also good media to publicize the competition. Essential factors such as when, where, qualification, way of grouping, kinds of cars, type of race and method of determining ranking should be described. If the race is the series system, announcement of dates of the following events is desirable.

4. ENTRY

Entry forms should be ready at the registration desk. Columns for name, address, age, occupation, entry class, frequency of radio control system, and contest number should be provided along with entrance requirements. It is recommended for a host organization to make an entry register book, as it will be useful for reference. With a series race, it is important to keep records of contestants. Entry forms are made in duplicate; one for participant, the other for the organization to make a ledger.

STORE GRAND PRIX ENTRY CARD

Name
Address

Age (Grade)	Occupation
Class	
Car Number (check one)	
Frequency Band	1 2 3 4 5 6 A B

Store Grand Prix Entry Card

1st		2nd		3rd		4th	
5th		6th		7th		8th	

5. GROUPING OF CONTESTANTS

●GROUP BY AGE.
●GROUP BY SKILL AND EXPERIENCE.

The above two methods are good ways to form groups. There can be a beginner and an advanced class, if sorting is carefully done. Top ranking contestants in the beginner's class can be placed in the advanced class in the next race.

6. GROUPING OF MODELS

●By batteries
●By motors

Basically there are these two classes. You could classify by types of cars or vehicles or by scale, but grouping by battery type or motor type is probably more satisfactory because the demands of different types of track will alter the battery or motor requirement. On a straight course where cars can race at their maximum speed, there can be a wide difference in result between cars with dry cells and those with nickel cadmium batteries, or amongst cars with nickel cadmium batteries of different voltage. On a track where a lot of corners call for deceleration, it is imperative to have separate classes for cars with 380 type motors, small but fast running, and those mounted with the big and powerful 540 type motors.

● Modified car class

As a modeller enriches his experience through numerous races and grows familiar with radio control, he is urged to modify and increase the performance of his car. Increasing performance may be endlessly sought after. However, considering the cost of modifications and the finesse required, only a few people may be able to achieve this. It is practical to organise a class of modified cars with some limits set to the amount of remodelling allowed, so that those who do not have the technical knowledge or the necessary finances to carry out major modifications, may participate in the race.

7. CONSTRUCTION OF COURSES

●SPEED COURSE
●TECHNICAL COURSE

A speed course has a rather long straightaway where it is easy to pick up speed. Performance of a car is a key factor to win or lose a race. So with a speed course, a distinction of cars driven by dry battery from nickel cadmium ones and remodelled car classes are necessary. A technical course consists of a lot of curves, and the driving techniques are more important than capability of a car. With the course, therefore, sorting of classes by car types is not necessarily required. Since the Tamiya cars can go backward, it might be interesting to adopt parking and reverse going courses.

8. REGISTRATION ON THE DAY

●CAR CHECK
●IMPOUNDMENT OF TRANSMITTERS

Ascertain who the participants are with the entry form. Check if the car is qualified under the requirements of the particular racing class. At the registration desk, impound the transmitters of all the contestants. Of course, return them to assigned racers just before the races begin. As soon as the race is over, the transmitters should be impounded again. In other words, all the transmitters of the contestant are to be under custody of the host organization all the time during the event, except for those which are being used for a race. This is done at any radio control racing gathering for the purpose of preventing interference.

• The transmitters in custody had better have attached a contest number and be kept in a grouping of frequencies.

9. RACE

●RADIO FREQUENCY CONTROL
●RACE ADMINISTRATION

In a radio controlled car race, cars using the same frequency cannot compete at a time. Reversely speaking, only as many cars as there are different frequencies can race simultaneously. However, to avoid interference, cars with every other frequency should be arranged to compete.

Band \ Group			
1	Mr. A	Mr. B	Mr. C
2	Mr. D	Mr. E	Mr. F
3	Mr. G	Mr. H	Mr. I
4	Mr. J	Mr. K	Mr. L
5	Mr. M	Mr. N	Mr. O
6	Mr. P	Mr. Q	Mr. R
A	Mr. S	Mr. T	Mr. U
B	Mr. V	Mr. W	Mr. X

• Contestants will be grouped under the same frequency bands.

• Reshuffle the contestants after each heat so they have a chance to compete in many heats.

1st heat (6 races)

Band \ Race	1	2		3	4		5	6
1	Mr. A			Mr. B			Mr. C	
2		Mr. D			Mr. E			Mr. F
3	Mr. G			Mr. H			Mr. I	
4		Mr. J			Mr. K			Mr. L
5	Mr. M			Mr. N			Mr. O	
6		Mr. P			Mr. Q			Mr. R
A	Mr. S			Mr. T			Mr. U	
B		Mr. V			Mr. W			Mr. X

2nd heat (6 races)

Band \ Race	7	8		9	10		11	12
1	Mr. A			Mr. B			Mr. C	
2		Mr. D			Mr. E			Mr. F
3	Mr. H			Mr. I			Mr. G	
4		Mr. K			Mr. L			Mr. J
5	Mr. O			Mr. M			Mr. N	
6		Mr. R			Mr. P			Mr. Q
A	Mr. S			Mr. T			Mr. U	
B		Mr. V			Mr. W			Mr. X

When there are eight contestants, a race is formed with four people to participate, making two races. Races are done repeatedly for each combination (each race called "heat" or "round"). Points of each heat are to be summed up to determine the final ranking.

●KINDS OF RACES

POINT SYSTEM RACE
TIME RACE
ROUND RACE

These three are typical kinds of races. And it is common through these three that the combination of the members should be changed so that any participant has an opportunity to compete with as many other contestants as possible.

●POINT SYSTEM RACE

Points are given to each heat. The points are totaled to decide the ranking.

★Depending upon combination of entrants to a heat, sometimes only 2 or 3 people can contend. Even in such a case, the points of the first place are awarded.

★When the total points of all the heats tie the score, a playoff will be held. When contestants using the same frequency should end in a draw, the winner is chosen by comparing the rankings of each heat, or else they are made to vie for superiority by running one by one for time.

●TIME RACE

Time required at each heat is recorded, and the ranking is determined by the total time. Sometimes the point system is used together with time to get the result more distinctly.

●LAP RACE

One who makes the most number of laps on the course in a given time is the winner. This method is often employed for long distance endurance contests. A notable common feature through point system, time and round races is that entrants have to be classified under a frequency to use. Because participants using the same frequency will be never contend at the same time under any circumstances, the final ranking is not necessarily reflected with their real ability of controlling models. This is something which cannot be helped so long as the frequencies are restricted to a limited number. However, the problem can be solved to some extent by arranging races in a series form or assorted with the time race system.

10. PENALTY POINTS

A participant should be penalized when he conducts himself against the spirit of fair play or against the smooth progress of a contest. The punishment is disqualification and then imposition of a cut in marks or additional penalty time.

★It is usual that interference to other cars and remodelling exceeding the limit should be liable to disqualification.

★A breakaway is subject to demerit mark. The penalty system should be constituted from the standard of annoyance to other participants or injustice among the entrants.

11. TROUBLE

When a model gets out of order in the midst of a race and is unable to proceed or out of control, all cars in the race should start again or the car alone should be retired.

●RESTARTING
In case the cars go out of control by radio interference, or the race is obstructed by spectators or somebody else, restarting will be done.

●RETIREMENT
In case a model cannot proceed in the race due to insufficient previous check up or because of an accident while racing, the said car only must retire from the race.

12. ACCOMMODATION

Ample consideration is desired to be given to conveniences and accommodations in the place of the meeting in order to produce an exciting atmosphere to the race.

●START FLAG
Generally a national flag or a flag of the host organization is in use.

●FINISH FLAG (CHECKER FLAG)
A checker flag of black and white is waved to the winner's car just before and when crossing the finish line.

●SCORE BOARD
To help the race proceedings, a score board is desirable to be installed for announcing the records of each heat and ranking to the public.

●CONTROL STAND
A stand is very convenient to install so that the racers can command the better view of the course and the cars while racing.

●PROPS IN THE COURSE LAYOUT
A bridge made of a tire or advertisement sign boards of companies which can be seen along a real racing track, and miniature guard rails used as pylons in the course will enliven the race.

84 RC OFF ROAD WORLD CHAMPIONSHIPS, TORONTO, CAN.

83 RC OFF ROAD WORLD CHAMPIONSHIPS, TORONTO, CAN.

RC OFF ROAD RACE IN TORONTO, CANADA

RC RACE IN OSNABRUCK, W. GERMANY

HOW TO BUILD A CIRCUIT

1. POINTS IN DESIGNING A RACING CIRCUIT

Building a racing course, even a simple one, lets you enjoy it far better than running a car in a large open space freely. You can make one very easily, i.e., by drawing lines with chalk or using empty bottles for pylons (when using a space of someone's possession, like a parking lot; of course, permission should be acquired beforehand). To make races more fun, some knowledge of courses are required.

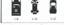
2. A TRACK BEFITTING THE CARS

You cannot expect a thrill of excitement in running cars along a too wide circuit. In a too narrow track, you cannot enjoy speedy driving. The maximum speed of 1/12 electric R/C cars is around 30 km/h and the width of the car body is about 20 centimeters. Based upon these figures, the following designing data will be introduced:

★The length of a course is 100-150 meters.
★The width of the course is 3-4 meters.
★The length of a straight way section is over 30 meters.

The maximum speed of 30 km/h comes to a little over 8 meters per second. Taking the slow down at corners into consideration, the car will make a round of a 150 meters long circuit in about 15 seconds. In the Tamiya Circuit, a round of the longest course out of the possible selections measures about 140 meters. A race is held by making three rounds. The average time required is approximately one minute. This is a rather long time to a racer, as he has to apply all his energies in the control of his car.

• COMPARISON OF 2 METER WIDE COURSE AND MODEL CARS



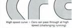
The width of the road should be desinged from the size (breadth) of the models. The 1/12 cars are 20 centimeters wide. So having 10 centimeters in between cars, then 2.5 meters of width is required for 8 racing cars. If a way should be established in that all cars do not start from the starting line in a row, a narrower width of the course would be permissible. But for avoiding collisions and bumping while passing each other, the breadth of over 2 meters 50 centimeters is desirable. The Tamiya Circuit is 4 meters wide (sometimes 3 meters), but still it does not look too broad. There should be at least one portion of a straight line in a course where cars are allowed to run at their maximum speed. The longest straight in the Tamiya Circuit is 37 meters long. 1/12 electric cars can cover this length in 5 seconds or so. Here, on this straight, the racer can take a breather. A longer straight course, depending on cars' ability, may be desirable. A drag race can be held in a straight of over 40 meters to contend for 0-400 meter pick-up performance (converted in 1/12, it should be about 33.4 meters.)

3. TRACK CHARACTERISTICS ARE DETERMINED BY CURVES

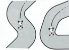
Circuits are roughly classified in two groups; a high speed course where velocity is important, and a low speed course where control techniques are more important. The features of a track are formed with the number and characteristics of many curves. An ideal circuit conceivable is a mixture of high and low speed courses for 1/12 electric model cars which boast of excellent maneuverability due to the differential gear device equipped.

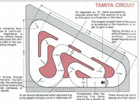
★Assorted curves should be incorporated.
★Vertexes of curves should be made with some bluntness.

• KIND AND CHARACTERISTICS OF CURVES



High speed curve = Cars can pass through at high speed (challenging running)
Medium speed curve = Some slow down is called for (this is where passing is done. Many car will be spinning and leave the course)
Low speed curve = Hair pin curve (prudent running is required)





To negotiate an "S" bend successfully, requires some skill. The velocity of a car at this point is influential in the result.

The longest straight track is the place to accelerate to the maximum in order to gain a lead.

Taking corners at a difficult hairpin curve without losing speed requires some skill.

The cornering technique of "out-in-out" for negotiating a curve without losing speed gives the driver a lead in the succeeding straight.

For driving through complete hairpin bends, the technique is to drive close to the inside (vertexes) of the bends.

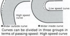
A car should decelerate when approaching a low speed complex curve in readiness for the following bend.

Immediately after the starting line there should be a length of straight track.

There should be some leeway at a high speed corner.

• COMPLEX CURVE - SUCCESSION OF MULTIPLE CURVES

Try to anticipate the course ahead.
Watch for places to pass skidding opponents.



Curves can be divided in three groups in terms of passing speed: High speed curve which a car can go through with almost no deceleration, medium speed curve where some slow down is required, and low speed curve. And in terms of layout, a simple curve is one built with a single radius, and a complex curve consists of multiple radii. Straights between curves are also influential. With all these features being incorporated, quite a challenging circuit can be made with curves of different characteristics.

Please refer to the illustration of the Tamiya Circuit and the drawing for the individual feature of curves. Also, note the point of vertexes are made not too sharp. According to the data gathered at the Tamiya Circuit, cars are apt to deviate from the course towards the outside at high speed curves and inside at low speed curves. The road surface of the curves have been modified accordingly.

4. FROM A DRIVER'S VIEW POINT

The biggest difference between the real car and the radio controlled model is, of course, the position of drivers. Hence, the following hints have been brought about:

★Portion of a circuit far from the drivers should be made broader.
★Complex course layout is not to be built far from the drivers.
★A circuit is to be designed with consideration from the driver's vision.

The farther away from the driver, the narrower the course looks because of parallax. It could be some problem to drivers. To compensate for this, this particular portion of a circuit should be widened. In case of the Tamiya Circuit, the opposite side of the track to the driver's stand is 4 meters wide. One meter wider than the near side. For the same reason, it is not recommended to design a course with complex curves where meticulous controlling is required a distance away from the driver. Some bridges and gates on the circuit are very useful auxiliary articles to make the circuit lifelike; however, again, attention must be paid not to block the view of curves from the driver's sight.

5. TO MAKE A RACE MORE ENJOYABLE

Most of the electric cars have the same or similar performance, so there is a likelihood that they could collide if there is a sharp curve right after the start of a race. Therefore, it is recommended that some length of straight running be available just after starting. It is not necessary to have the circuit at one level. On the contrary, some undulation and a leaping slope or two may be useful to add to the course more variety and making the race more enjoyable, unless these objects would hide the car from their vision.

6. TRACK SURFACE AND COURSE SIDE

★The pavement of the track need not be very smooth.
★Drainage is important.
★Lawn is ideal for course side.

Pavement of simple surfacing asphalt is

adequate without a firm foundation. Or a Sunday chore by the club members to lay concrete surface may suffice for the purpose. Some uneveness and slope will not be a cause of trouble, but drainage should be planned carefully.

Shortly mowed lawn on the side space of the course is ideal when considering deviation of cars from the track. However, it would call for time and care to grow. On the Tamiya Circuit, artificial turf is employed on the space between the roads, and outside spaces are kept as dirt surfaces. In cases of dirt surface, all the pebbles should properly be picked up and the surface tamped down. Also, tall grass and leaves must be disposed of since they might jam into a shaft of the car.

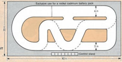
The joint of the track and the side space may be built on one level or in a gentle slope, the outside being high, if there should be any rise and fall between surface levels, in order to allow a car that deviated to get back to the course with ease. When the space between courses is very narrow, some device may be needed to keep a car from jumping into the next course.

7. DRIVERS CONTROL STAND AND OTHER AC COMMODATION

The larger a circuit is, the taller the control stand must be. The Tamiya Circuit has a control stand of 1.20 meters high. However, when a stand is too high, it would be inconvenient to step up and down. Sometimes a hand rail, for safety's sake, may be necessary.

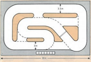
Besides bridges and gates on the circuit, a signal light for starting, a control tower, sign boards of sponsors, and things like that are desirable so as to boost up the atmosphere; hints of such auxiliary props can be obtained in car and racing magazines.

VARIOUS PLANS OF CIRCUIT LAYOUT

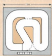


1 LARGE CIRCUIT

2 HIGH SPEED TECHNICAL CIRCUIT

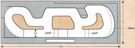


3 SQUARE



Width of course over 2 meters

4 TAMIYA OFF ROAD CIRCUIT



RC CIRCUIT IN DENMARK

RC OFF ROAD COURSE IN SINGAPORE

RC ON ROAD COURSE IN SPAIN

TAMIYA CIRCUIT IN JAPAN

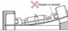
BUILDING A HIGH PERFORMANCE CAR

Even the same type of radio controlled electric car kit may produce much diversified performances and characteristics in accordance with a way it is assembled and adjusted; for example, some cars are easy to control and some are not so easy as others.

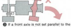
1. FUNDAMENTAL REQUIREMENT IS THAT THE CAR RUNS STRAIGHT

Even with a real automobile, moving in a straight line is the essential condition. A model should be so adjusted that it takes in a beeline for 5 meters or so without touching the steering wheel. A car which does not go straight cannot be controlled easily. Note the following points:

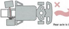
❶ A car with distorted chassis would not go straight; therefore correct the chassis so that the four wheels should touch the ground evenly. Particularly after collision, look into it carefully.



❷ If any wheel should not rotate smoothly, the car would turn in the direction of that wheel. Assemble a car with care so all wheels revolve evenly. This is related to car's running capability.

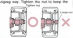


❸ If a front axle is not set parallel to the rear axle, the car will steer crooked.



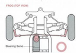
❹ With a bent rear axle the car will keep turning.

❺ When a wheel is not secured firmly with the nut, the car may be going in a zigzag way. Tighten the nut to keep the wheel in position in such a way that there is no play between the wheel and the axle, but still allows the wheel to turn smoothly.

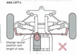


❻ The steering servo and servo horn should be arranged so that the front wheel will head forward right and the attitude of the servo horn is parallel to the front wheels (some cars requiring a right angle), when the steering servo (consequently the steering stick and trim lever) is in the neutral position. When this arrangement is not right, the car would not go straight or it will change its course unevenly to right and left. Being installed with a screw, servo horns can be readjusted by unscrewing.

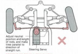
FROG (TOP VIEW)



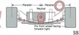
<IT GOES STRAIGHT BUT TURNS UNEVENLY RIGHT AND LEFT>

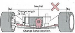


<DOES NOT GO STRAIGHT>

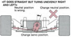

Adjust neutral position and length of rods, and make tires parallel to direction of straight run.
Steering Servo

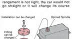
PORSCHE 956 RM Mk.5 (FRONT VIEW)





<IT GOES STRAIGHT BUT TURNS UNEVENLY RIGHT AND LEFT>

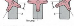




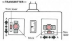
❼ Try to mount radio control units and batteries into a car, balancing the car evenly.

❽ Be careful that tires and steering linkage will not rub against the body. Lastly, have a test run to see if it advances in a beeline. If not, adjust it with the trim lever on the transmitter. With the trim lever, you can do the fine adjustment of servo movement, having the same effect of shifting servo position.

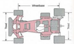
<<SERVO HORN MOVEMENT>>



<<TRANSMITTER>>



(HINT) A car with long wheel base in relation to tread has stability and tendency of going straight.

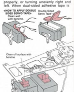


2. HOW YOUR CAR TAKES CORNERS

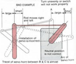
A car which goes straight is easy to control in principle. Such a car should have no peculiar action when taking corners. Cars with a peculiar way when turning can be corrected in the following ways.

❶ The direction of front wheels are controlled by the movement of a servo. In case a servo is not secured in position firmly, the car tends to be unstable having a jittering or not responding to the control properly, or turning unevenly right and left. When dual-sided adhesive tape is used for mounting a servo, wipe the surface of the servo with cloth dampened with benzine or solvent carefully. (Lacquer thinner may dissolve servo cases.)

<HOW TO APPLY DOUBLE SIDED SERVO TAPE>

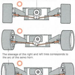

Double Sided Servo Tape
Clean well with benzine.
Clean off surface with benzine
Double sided tape
Install servo firmly making sure it's not loose.

<<INSTALLATION OF SERVO HORN>>

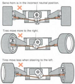

BAD EXAMPLE
Turn unevenly or switch will not work properly
large
small
A
large
B
small
C
Rod moves right and left
Installation of servo is incorrect
Neutral position is not correct
Arc of servo horn

Travel of servo horn between B & C is almost vertical and shows less horizontal movement than from A to B.

(Correct installation of servo horn)


Servo horn is in the correct neutral position.
The steerage of the right and left tires corresponds to the arc of the servo horn.

(When servo horn is installed incorrectly)


Servo horn is in the incorrect neutral position.
Tires move more to the right.
Tires move less when steering to the left.

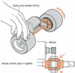
Correct example ≪Installation of Servo Horn≫

Bad example ≪Installation of Servo Horn≫

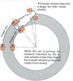
❷ In most cases where the car does not curve evenly, i.e. a small turn to the right and a bigger turn to the left under the same steering angle, it is caused by incorrect installation of a servo horn to the servo. In such a case, straighten the problem by taking the procedures as per stated in the previous chapter "Fundamental Requirement is That the Car Runs Straight".

❸ When a differential gear does not work properly (the same state as if without a differential gear), the car is apt to make a big turn or take corners awkwardly. Check it by holding one wheel firmly and turn the other wheel; smooth rotation indicates the differential gear is in good condition. When it does not, try to give some play in the gear meshing.

≪CHECKING DIFFERENTIAL GEAR≫

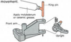


WHY DIFFERENTIAL IS USED



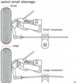
When the car is turning, the distance travelled by the inside wheels is less than that of the outside wheels so they will rotate more slowly.

❹ Check whether or not a servo rod, servo horn, or wheels are in contact with something like the car body and preventing right movement.



❺ Oil the king pin of the front wheels. Steering will then operate lightly.

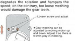
(HINT) Steerage (degree of changing direction of front wheels) can be varied by shifting the connecting point of the servo rod. It is recommended for a beginner to select small steerage.



3. FOR SPEEDING UP (TUNE UP)

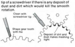
Most electric car kits are produced to come out with similar performance. In practice, however, the models assembled will show varied ability. The reason why some cars do not run faster than others are, in most cases, that they have additional friction around the rotating parts; in other words, they have a rotating section which, either partly or all, does not revolve smoothly. The following are the points to take care of, needless to say applying oil or grease to the places required.

❶ Furnish some play in the meshing between the pinion gear of the motor and the differential gear. Too tight meshing degrades the rotation and hampers the speed; on the contrary, too loose meshing would damage the gear teeth.



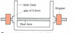
★Gear meshing can be adjusted by moving motor up and down. Adjust it so there is 0.5mm play in meshing.

❷ Clean the surfaces of gear teeth with a used toothbrush or scrape them with the tip of a screwdriver if there is any deposit of dust and dirt which would kill the smooth rotation.

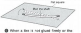

Clean with screwdriver tip
Shape gear tooth with file
Deposit of dirt and dust makes meshing tight

❸ A chipped or deformed gear tooth will diminish the rotation. Particularly a brass gear is easily warped; in such a case, reshape it with a file carefully.

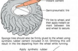
❹ The collar should not be located against the bearing too tightly. Secure them in such a way that there is some leeway so that the shaft would move slightly right and left.



❺ A bend in the rear shaft will be a cause of unstableness of the car, especially when running at high speed since it may make the car slower compared to other cars. The bend can be found out easily by rolling the shaft slowly on a flat surface.

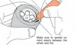


❻ When a tire is not glued firmly or the wheel hub is warped, the effect is the same as if the axle is bent; the car cannot go fast.



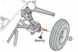
Fit tire to wheel, and then apply instant cement between tire and wheel to secure.

Sponge tires should also be firmly glued to the wheel using synthetic rubber cement included in kit. Omitting this will result in the tire departing from the wheel while running.



Make sure to spread cement evenly between the wheel and tire.

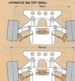
❼ Oiling of the front axle is often over-



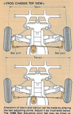
looked. Do it without fail. Poor rotation on the front wheels influences the car's speed more unfavorably than you may think.

❽ Improper toe-in and toe-out adjustments are resistant to the car. The model car runs well without toe-in and toe-out or with a few degrees of either.

<PORSCHE 956 TOP VIEW>

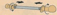


<FROG CHASSIS TOP VIEW>

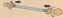


Alteration of toe-in and toe-out can be made by altering the ball adjusting joints. Adjust it as illustrated below. The 5068 Ball Adjusting Joint Set may be fitted on other model cars.

<< ADJUSTMENT OF THE LENGTH OF THE ROD >>



The length of the rod is shortened by turning clockwise.



The length is extended when turning counterclockwise.

DAILY MAINTENANCE

Daily up-keep of your cars is important for maintaining performance. This will help you to find any possible defect. Without daily care the capabilities of acceleration and maximum speed of your models can deteriorate. Keep your cars in the best condition possible at all times.

1. CARE AFTER RUNNING

After running your model be sure to clean it and carry out any necessary repairs ready for the next time you wish to run the car.

★ATTENDING TO CONTROL MECHANISMS

The radio control units and switches will be covered with dust after the model has been run. The contacts of the switches must be cleaned in order to avoid poor contact. Any component damaged or out of position must be replaced or repositioned. Dry cells may be in need of exchange. Also check the batteries of the radio control units. As a general guide, the receiver batteries are exhausted sooner than those of the transmitter. Inadequate batteries tend to be a cause of many breakdowns.

★DIRTY COMPONENTS AROUND THE CHASSIS

After a day's activity, all parts and sections around the chassis will be in a dirty condition. Look particularly at the moving parts; any foreign objects in the bearings influence the rotation of the wheels. For inaccessible places use Tamiya Oil Spray, which has a detergent effect and is very useful for cleaning. Check if any nut or bolt is loose and oil all journal sections. See if the rear axle is bent; replace if necessary.

★DAMAGE TO BODY

Radio controlled racing cars are not only for running, but are also fine scale models. It is certainly not recommended to run the cars without a windscreen, with a door broken, or with a big hole on the body or any similar damage. Always keep your model in the best condition possible. Items you will probably need for repairing are plastic sheet and different kinds of glue. Synthetic rubber cement and instant glue are useful, as well as plastic glue.

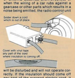
2. TO KEEP YOUR CAR AT PEAK PERFORMANCE

Parts will wear out or become broken after periods of high speed running and use. Replace any damaged parts and keep your model constantly rejuvenated.

MAINTENANCE OF ELECTRIC SYSTEMS

★REPAIRING ELECTRIC WIRE

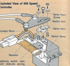
The electric wire is able to withstand to some degree moisture and stretching. Accidental contact of exposed wires will result in a short-circuit, which may damage the battery, motor or switch; sometimes causing components to burn up. A wire out of place may jam into a shaft of the car. When the wiring of radio control units or antenna becomes short-circuited, or when the wiring of a car rubs against a gearcase or other parts which results in a noise being emitted, the radio control unit will be disturbed and will not operate correctly. If the insulation should come off any part of the exposed electric cord, it must be mended immediately and thoroughly. Any joins in the wiring about to break should be rejoined firmly, preferably by soldering. If a radio control unit or antenna should fail to work correctly, it must be repaired by a competent radio repairer.


Solder down a cord which is out of place.
Cover with vinyl tape any part of the cord where insulation is coming off.

★POOR CONTACT OF WIRING

Since it draws a lot of current, the speed control switch when it sparks will scorch its contact points. This scorching will, after a while, cause poor contact. The points of the connectors and switches must be polished once in a while to allow electricity to flow with less resistance. Most poor contacts in the connectors may be repaired by a screw driver; refer to the chapter headed "Trouble Shooting." Scorched contacts of a switch should be carefully polished with very fine sandpaper. Metal contact surfaces wear away after repeated use, particularly ones in a speed control switch which are used excessively, and should be replaced after some period of operation.

Exploded View of 956 Speed Controller



Applying switch lubricant reduces arcing, smooths movement and prolongs life of speed controller.

MAINTENANCE OF MECHANISM AND CHASSIS

★LOOSENED INSTALLATION OF RADIO CONTROLLED UNITS

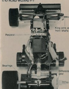
The adhesive power of double-sided tape is much reduced after one application. If the tape is reused to install servos or receivers, the units will be moved out of position due to accidents or vibrations. Loose bolts and nuts fixing the servo bands and servo trays may result in inaccurate control of the car. For installing steering servo and speed control servo firmly, renew the tape and tighten loosened bolts and nuts. Keep the double-sided adhesive tape in a cool and dry place, otherwise its adhesive properties may deteriorate. On the other hand, if the tape applied will not come off easily, wipe with a cloth dampened with benzine or water. The same cloth moistened with benzine assures strong adhesion if used to clean the surfaces of objects, i.e. servos and servo mounts, before applying the new tape.

★LOOSENING AND DETERIORATION OF BOLTS AND NUTS

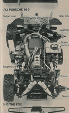
Nuts and bolts are indispensable assembly parts and can become damaged during the running of the car or by misuse. Screws tightened excessively may twist off, or the thread may become worn. Bolts can be bent during collision and if not replaced could snap off during racing with disastrous results. Therefore, it is sensible to always change any bolts and screws that are bent, cracked or damaged in any way, before the next race. Check that all nuts and bolts, including lock nuts for fixing the shafts and all other small screws, have not slackened. Retighten if necessary.

LUBRICATING POINTS

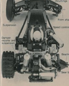
1/10 ROAD WIZARD F-1



1/12 PORSCHE 959

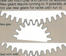


1/10 THE FOX



★MESHING OF GEARS

The gears play a vital role in transmitting the motor power and they are subject to wear. Any dirt and dust between the gear teeth will act as a file and abrase the surfaces and any such deposit should be removed carefully. Occasionally, gears may be broken by small pebbles and these must be replaced. Your car will run much better if regular attention is given to the careful cleaning etc. of the gears. Check that the gears have not worn away so that they have too much play and cannot be adjusted. New gears require running in. If possible, do not use new gears for races until run in.



★DAMAGED CHASSIS

The performance of your car will be greatly affected by the state of the car's chassis. A bent, warped, or otherwise deformed chassis will cause the car to have different cornering characteristics. A damaged front chassis and gearcase will similarly adversely effect the performance of the car. Check for any twist or bend of the chassis by placing it on a flat surface. Some twisted chassis may be reformed. A crooked chassis may possibly be repaired by pounding with a plastic hammer. However, this may weaken the structure and make it impossible to fit perfectly.

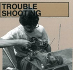
★SUSPENSION MAINTENANCE

Bad movement of the suspension interferes with the running performance of your car. Check if the suspension components move smoothly or not, and if necessary, lubricate using oil and grease. At the same time, check the movement of oil dampers. Depleted damper oil within the shock absorbers results in stiff movement of the unit. Check oil periodically and replenish if necessary. In case of a bent piston rod, replace it at once with a straight one.

★GREASE-UP POINTS

It is necessary to grease around the front and rear axles where parts rub against each other to reduce friction and abrasion. After races, besides checking of structural or mechanical parts, it is important, especially after races in the rain or through puddles, to look for signs of rust on metal parts and to check if rotating parts require oil or grease. Correct lubrication gives not only smooth rotation of wheels, but also allows proper adjustment to the steering and gives smooth operation. Lubricate the meshing of the gear teeth, suspension systems and around the rear axles which are influential in giving effective power transmission. The Tamiya Spray Oil is very useful for taking care of these sections.

TROUBLE SHOOTING



1. WHEN THE CAR FAILS TO MOVE

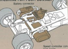
❶ See if the switching servo operates properly. If not, you may have neglected to switch on either or both your transmitter and receiver, or your batteries are dead. You may have even failed to install batteries. Also, the wiring between the receiver switch and the receiver or between the receiver and the servo may be disconnected. Inoperative radio control units can be detected by replacing them with another unit.

❷ Remove the pushrod between the speed control switch and the switching servo. If the servo operates correctly, then the method of installing the rod, or the position of the servo may be wrong and excessive resistance may hinder the movement of the servo. Something may also be in the way of the movement of the speed control switch. Please also refer to (2-❶) in "When the Car Does Not Gain Speed" for methods of mounting a servo correctly.

❸ When the switching servo and the speed control switch are operative and the motor does not rotate, see if the batteries are fresh or charged, and the fuse is in good condition. If the fuse is blown, repair the short circuited portion, referring to "Causes of Blown Fuse" before replacing the fuse.

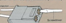
❹ Remove the motor from the gearbox and see if it will run. If it does, the meshing of the gears may be too tight, or the rear axle or the drive shaft may be seized. Remove the axle or shaft and carefully polish the seized part with sandpaper and lubricate it. Determine if the axle or shaft will revolve smoothly in the bearings. "For Speeding Up" in "Building A High Performance Car" is good reference material for this.

CHECKING FOR POOR CONTACT



❺ When the motor is removed from the gearbox and does not run, incorrect wiring, or poor contacts in the battery box, switch, or in the connectors are possible. Check the wiring first. If nothing is wrong with it, press down on the battery box, switch and connectors. If the motor starts to run, it indicates that the component pressed on may have a poor contact or connection.

★The connector may wear out and develop a bad contact after repeated use. Crimp the tubular contact point using the tip of a screwdriver to make the contacts slip in firmly.

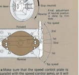


❻ Since the motor is precision made, it can become damaged when dropped, dipped into water, short circuited, or connected to too many batteries.

2. WHEN THE CAR DOES NOT GAIN SPEED

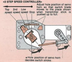
❶ Make sure the speed control switch operates properly. If the switch goes into high speed only in the reverse position, or when manipulated by hand with the servo rod disconnected, the neutral position of the servo may be out of adjustment. Adjust it with the trim lever of the transmitter. After that adjustment, if it does not shift into the reverse speed but works correctly in the forward setting, see if the servo and the servo rod are installed correctly as illustrated below so that the switch blade can go all the way to the maximum speed end. When the adjustment is incorrect and the switch blade does not move all the way to the end or goes over it, problems may arise.

BIGWIG SPEED CONTROLLER



★Make sure that the speed control plate is parallel with the speed control servo, or it will result in poor contact. Check neutral position of servo before installing speed control arm to ensure that arm reaches the forward and reverse top speeds.

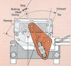
<3 STEP SPEED CONTROLLER>


Top speed
2nd speed
Low speed
Stop
Adjust hole position of servo horn so that switch blade moves to the place shown when transmitter stick is pushed up to full.
★Hole position of servo horn decides switch stroke.

★Adjust the height of servo horn and switch plate as even as possible. Bad contact happens in top speed position, if the difference between the two is large.

ROAD WIZARD SPEED CONTROLLER

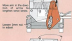
★Adjust stop position using transmitter trim lever.

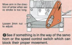


When the speed controller and servo horn are not aligned as shown, adjust by loosening these screws.

★Long running at middle and low speed may burn out the speed controller. Adjust speed control arm to reach top speed position.

ADJUSTING SERVO STROKE


Move arm in the direction of arrow to lengthen servo stroke.
Loosen 2mm nut to adjust.


Move arm in the direction of arrow when servo stroke is too long.
Loosen 2mm nut to adjust.

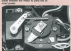
❷ See if something is in the way of the servo horn or the speed control switch which can block their proper movement.

❸ When car does not run with the speed controller arm in top speed, check contact by pressing lightly on the speed controller arm. If the car runs upon pressing, this indicates faulty contact within the speed controller. Clean all dirt and debris from contact and re-apply switch lubricant. Also check to see whether contact points are worn and change if necessary.

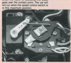
❹ Check to see if the gear meshing or the shaft are too tight. Make sure the wheels rotate smoothly. Be sure to lubricate shaft and gearbox.

<ADJUSTMENT OF SWITCH>

Correctly adjusted travel of the switch blade enables the motor to yield the utmost power.

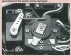


When the travel is excessive, the blade goes over the contact point. The car will not run when the speed control switch is in this maximum position.



★The adjustment of the blade should be made referring to the assembly instruction sketch of the kit.

When the travel is inadequate, heat is generated and the switch will be damaged.

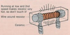


3. ABOUT VOLTAGE DROPPING RESISTORS IN R/C CARS

Apply Tamiya switch lubricant to contact points of speed controller. It prevents poor contact caused by arcing, and ensures good current flow.

Resistors are utilized in all speed controllers to vary the amount of voltage passing to the motor so that different speeds can be obtained. Resistors impede the flow of current from the battery to the motor and the excess current is bled off in the form of heat. At full speed, the resistor is not impeding any current flow, so there is no heat to dissipate. When "Throttling" back, to slow down, or run at a lower speed, the fixed resistors will get very hot in the step type speed controllers. The variable control speed resistor (Wire wound) that use a sliding blade, are electrically altering the length of the resistor wire, so this type of speed control does not heat up like the others. When driving in the low or 2nd speed the ceramic resistors will get very hot, so do not touch them.

Running at low and 2nd speed makes resistor very hot, so don't touch it!



4. WHEN THE CAR DOES NOT TURN

❶ Does the steering servo operate properly? If not, the wiring from the receiver to the steering servo may be disconnected.

❷ Remove the steering servo. If it operates normally, the servo horn or the servo rod may be rubbing against something. Also, it is possible that the king pins of the front wheels do not move smoothly.

❸ When the car does not take corners well, refer to 1 and 2 on the page of "Building a High Performance Car."

5. WHEN A CAR DOES NOT STOP

❶ Do the speed control switch and the switching servo stop at the neutral position? If not, adjust it with the trim lever on the transmitter. After the adjustment, if the car runs at high speed even though the switch is in the stop position, the switching servo or the servo rod may be mounted improperly. Correct them referring to ❶ in "When the Car Does Not Gain Speed".

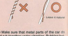
❷ Excessive play in the connection between the switching servo and the speed control switch may cause the switch to fail to return to the stop position even when the servo is at the neutral position.

6. IF THE RADIO CONTROL DOES NOT OPERATE

❶ If the batteries of the transmitter or receiver are low, the radio control will not operate. Replace with new batteries.

❷ Are the antennas of the transmitter and receiver OK? The following actions make the reception of radio signals poor: shortening the receiver antenna wire, winding the wire around the antenna tube, leaving the wire inside the model car, or removing the insulation of the wire.

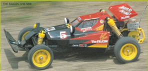
<HOW TO FIX ANTENNA WIRE>

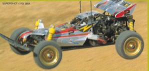


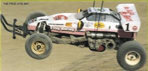
❸ Make sure that metal parts of the car do not rub together under vibration. Rubbing between metal parts will sometimes generate radio noise which disturbs radio control.

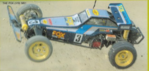
❹ Hold the transmitter away from the car with the control stick in the neutral position. If the servos are glitching, it is most likely caused by radio interference.

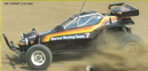
Never run a car off a cliff or make unrealistic jumps that can damage your car.

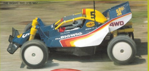

THE FALCON (1/10) 5856

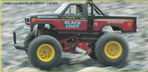

SUPERSHOT (1/10) 5854

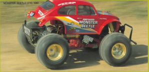

THE FROG (1/10) 5841


THE FOX (1/10) 5851


THE HORNET (1/10) 5845


THE BIGWIG 4WD (1/10) 5857


FORD F-150 RANGER BLACKFOOT (1/10) 5850

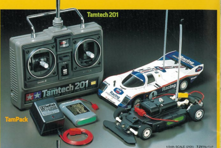

MONSTER BEETLE (1/10) 5860

1 PORSCHE 962C Complete Kit
ポルシェ962C

The Porsche 962C endurance racer is an improved version of the successful 956 racer. It made its debut during the 1985 season and finished the year winning six out of ten races. The 1986 model had an improved 3 liter engine and transmission. This Tamtech 1/24 scale R/C car provides the action and thrills of controlling a precision R/C miniature model both in or outdoors. All the necessary items, including R/C unit and Ni-Cd battery, are contained in this kit. Chassis is a monocoque type made of engineering plastic. The impact resistant body is injection molded for precise detailing. Front suspension is a coil damped independent type while the rear is a coil damped link type with stabilizer.

(Model Specifications) ●Scale 1/24 ●Overall length 201mm ●Overall width 83mm ●Overall height 46mm ●Wheelbase 116mm ●Tread Front 70mm, Rear 67mm ●Tire diameter/width Front 24/10mm, Rear 27/13mm ●Weight fully equipped Approx. 390gms ●Body Impact resistant special resin ●Frame Engineering plastic monocoque type ●Suspension Front coil damped independent, Rear link type with stabilizer ●Motor Mabuchi FK-180SH Mini Black ●Gear ratio 8:44, 10:44, 12:44, 14:44 ●Power source Tamiya Ni-Cd 7.2V 270mAh Tampack Battery ●Speed control Amplifier operated forward/reverse variable ●Control unit Tamtech 201 two channel digital proportional unit

★Charger varies according to country.



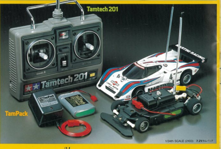
1/24th SCALE (2101) 7.2Vタムパック

3 LANCIA LC2 Complete Kit
ランチアLC2

The LC2 is Lancia's first Group C racer, which made its debut during the 1983 season. Its superb high speed ability has enabled it to take the pole position on numerous races. The LC2 was upgraded with a 3 liter turbocharged V8 cylinder engine during the 1984 season to combat the Porsches. This Tamtech 1/24 scale R/C car provides the action and thrills of controlling a precision R/C miniature model both in or outdoors. All the necessary items, including R/C unit and Ni-Cd battery are contained in the kit. Chassis is a monocoque type made of engineering plastic. The impact resistant body is injection molded for precise detailing. Front suspension is a coil damped independent type while the rear is a coil damped link type with stabilizer.

(Model Specifications) ●Scale 1/24 ●Overall length 209mm ●Overall width 83mm ●Overall height 46mm ●Wheelbase 116mm ●Tread Front 70mm, Rear 67mm ●Tire diameter/width Front 24/10mm, Rear 27/13mm ●Weight fully equipped Approx. 390gms ●Body Impact resistant special resin ●Frame Engineering plastic monocoque type ●Suspension Front coil damped independent, Rear link type with stabilizer ●Motor Mabuchi FK-180SH Mini Black ●Gear ratio 8:44, 10:44, 12:44, 14:44 ●Power source Tamiya Ni-Cd 7.2V 270mAh Tampack Battery ●Speed control Amplifier operated forward/reverse variable ●Control unit Tamtech 201 two channel digital proportional unit

★Charger varies according to country.

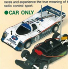


1/24th SCALE (2103) 7.2Vタムパック

TAMTECH R/C SYSTEM

The 1/24 scale Tamtech radio control series car models are designed for radio control operation, to provide the modeler with the thrill and satisfaction of building and controlling a precision scale miniature model. Enjoy organizing races and experience the true meaning of this radio control sport.

●CAR ONLY



PORSCHE 962C

The Tamtech Car contains the same high performance car as in the Tamtech Complete Kit except for the Tamtech radio control unit, and Ni-Cd 7.2V-270mAh Tampack battery. This kit allows you to collect the entire series of cars without radio control units, adding the radio control units at a later date, or when required.

LANCIA LC2

The Lancia LC2 rivals the Porsche 962C in the real world of racing, and it is only natural to include this superb car in the series. The Lancia LC2 Tamtech Car contains the same high performance car as in the Tamtech Complete Kit except for the Tamtech R/C unit, and Tampack battery.

●TRANSMITTER AND RECEIVER

TAMTECH 201 R/C UNIT

TAMTECH 201
2 CHAN. DIGITAL
PROPORTIONAL
R/C SYSTEM

The Tamtech radio control unit was developed in conjunction with the Futaba Corporation exclusively for the Tamtech radio control car series. The amplifier operated speed controller and receiver are combined in the C.P.R. (Control Processing Receiver) unit and obtains its power from the running battery. The Tamtech radio control unit can be widely used in miniature cars. Different frequencies are presently available for the radio unit.

●BATTERY & CHARGER

TAMIYA Ni-Cd
BATTERY
7.2V-270mAh
TAMPACK

TAMIYA Ni-Cd 7.2V-270mAh TAMPACK BATTERY

This is a powerful, small Ni-Cd battery developed for the Tamtech R/C car series. It consists of six 1.2V-270mAh Ni-Cd batteries in series, to provide excellent acceleration and performance. It is also economical, as it can be charged more than 500 times.

TAMIYA Ni-Cd
BATTERY
7.2V-270mAh
TAMPACK
QUICK CHARGER

TAMIYA Ni-Cd 7.2V-270mAh TAMPACK BATTERY QUICK CHARGER

This charger enables you to quick charge your 7.2V Tampack battery in about 15 minutes using a car cigarette lighter. The charger is equipped with a timer and a pilot lamp to ensure safe trouble free charging of your battery.

●SPARE PARTS

Tamiya provides a wide range of spare parts for you to keep your Tamtech R/C car in top competition condition. Spare parts are necessary for maintenance and tuning up for races. Like large scale R/C models, adjustments are required to keep the lead at the track. Spare parts, such as decals, wheels, motor, body parts sets, differential gears, etc. are available.

FK-180SH
MINI BLACK MOTOR

FK-180SH MINI-BLACK MOTOR

This is a powerful performance electric motor for the Tamtech radio controlled cars. The connectors are pre-wired and can be installed easily without any soldering. A good performing motor is a must in maintaining the high performance of these radio controlled cars. Replace a worn out motor at an early period.

SPONGE TIRE A
WITH WHEEL

SPONGE TIRE A with WHEEL

Worn out tires hinder the performance of the car. Replace worn tires at an early stage to maintain stability and handling at the track. Tires are pre-fitted to the wheels for quick replacement.

PORSCHE 962C
SPARE DECAL

LANCIA LC2
SPARE DECAL

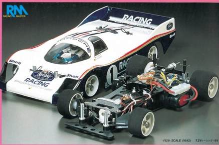
SPARE DECAL

These decal sets are for redecorating, or replacing dirty and damaged decals for the Tamtech radio control car series.

BF Goodrich 962
SPARE DECAL

Sponsor
Geest Lancia
SPARE
DECAL

TAMTECH R/C SYSTEMS		KIT NO.
COMPLETE KIT Car kit R/C unit Battery & charger 	Porsche 962C Complete kit	2101
	Lancia LC2 Complete kit	2103
	BMW GTP Complete kit	2107
	Ford Mustang Probe GTP Complete kit	2108
CAR ONLY R/C unit & battery not included 	Porsche 962C Car only	2102
	Lancia LC2 Car only	2104
	BMW GTP Car only	2105
	Ford Mustang Probe GTP Car only	2106
BODY PARTS SET 	Porsche 962C	2601
	Lancia LC2	2602
TAMTECH 201 R/C UNIT 	Transmitter C.P.R. unit Steering servo	1101
CRYSTAL SET RX/TX For receiver & transmitter		1102 / 1107
Ni-Cd 7.2V-270mAh TAMPACK BATTERY 		5530
Ni-Cd 7.2V-270mAh TAMPACK QUICK CHARGER 		5532
FK-180SH MINI-BLACK MOTOR 		2603
SPONGE TIRE A (4 ea.) 	with wheel	2604
	Front tire (4 ea.)	2608
	Rear tire (4 ea.)	2609
SPARE DECAL	Porsche 962C	2606
	Lancia LC2	2607
	BF Goodrich 962	2610
	Sponsor Geest Lancia	2611
DIFFERENTIAL & PINION GEAR SET 		2605
TAMTECH BALL BEARING SET 		2612



1/12th SCALE (5842) 7.2Vレーシング・6V

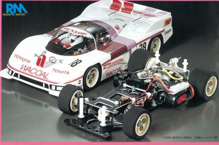
42 PORSCHE 956 RM. Mk. 5

ポルシェ956 レーシングマスター Mk. 5

This high performance Porsche 956 R/C model was developed for racing competition. It is a three point suspension vehicle with a front independent suspension using coil springs for damping, and the rear suspension is a single point adjustable swing unit, newly designed for competition. Adjustable stabilizer bar adapts this racer to any track conditions. Frame is lightweight FRP of the double deck type. Flat coil speed control is adjustable for soft and hard braking, and uses a positive contact wiper. It is the fastest R/C car Tamiya has yet designed.

About the prototype. ● The Porsche 956 is a group C racing vehicle developed for the World Endurance Championships. Its aerodynamic body with a refined ground effect undersurface uses a 2649cc opposed six cylinder turbocharged engine of 600 hp. It has won, to date, the 1982, 83 and 84 championships.

(Model Specifications) ● Scale: 1/12 ● Overall length: 377mm ● Overall width: 170mm ● Overall height: 82mm ● Weight fully equipped: 950g ● Wheelbase: 203mm ● Tread: Front/rear 135mm ● Tire diameter/width: Front 48/25mm, rear 53/35mm ● Body: Polycarbonate ● Front independent suspension using coil springs for damping ● Stabilizer bar for rear sway adjustments ● Motor: RS-540SD Black Motor Endurance ● Gear ratios: 1/3.1, 1/3.44, 1/3.65, 1/3.88 ● Power source: Tamiya 6V/1200mAh Ni-Cd or 7.2V racing pack Ni-Cd ● Speed control: Forward variable, reverse one step. Variable braking ● Radio Control unit: 2 channel, 2 servo required. Radio and batteries not in kit.



1/12th SCALE (5849) 7.2Vレーシング・6V

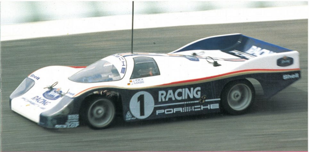
49 TOYOTA TOM'S 84C RM. Mk. 6

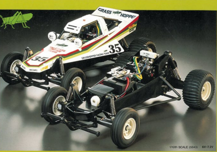
トヨタトムス84C レーシングマスター Mk. 6

A group C Endurance racer that can lead the pack. It uses a sophisticated 3 point suspension system with front coil springing for positive and stable control on all tracks. The one point rear swing adjustment is easily accomplished for differing road conditions. This model utilizes the same basic chassis as the Porsche 956 Racing Master Mk.5, and the vehicle was engineered for winning. The aerodynamic styling of Toyota TOM'S body is functional, as well as pleasing, and its performance will delight those who race with it.

About the prototype ● Toyota TOM'S 84C took a 7th place at the World Endurance Championships held at the Fuji Speedway, Japan in 1984. The first five places were taken up by the well known Porsche 956. It utilizes a modified Toyota 4T-GT turbo engine which produces over 500hp, and it is expected to be a formidable rival.

(Model Specifications) ● Scale: 1/12 ● Overall length: 358mm ● Overall width: 170mm ● Overall height: 80mm ● Wheelbase: 203mm ● Tread: Front/rear 135mm ● Tire diameter/width: Front 48/25mm, rear 53/35mm ● Weight fully equipped: 970g ● Body: Polycarbonate ● Frame: Double deck type of FRP ● Suspension: Front independent using coils, rear rigid swing arm with stabilizer ● Motor: 540 type ● Gear ratios: 1/3.1, 1/3.88 ● Speed control: Forward variable, reverse one step. Variable braking ● Power source: Tamiya 7.2V racing pack (not in kit) ● Radio control requirements: 2 channel, 2 servo (Not in kit)





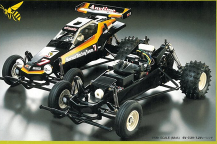
1/10th SCALE (5843) 6V-7.2V

43 The GRASSHOPPER
グラスホッパー

This off road racer is ideally suited for those just getting into the field of R/C modeling. Low in price but high in performance. Includes the popular 380 type motor for many minutes of exciting driving on each charge of the battery. Sophisticated suspension and heavy duty differential gearing. Can be tuned up with the 540 type motor, ball bearings and oil filled shocks, to provide fantastic performance.

About the prototype ● Real off road vehicles are normally a single seater built on a narrow chassis and powered by a powerful engine. They came into being in the United States and each is individually marked, painted and no two are the same.

(Model Specifications) ● Scale: 1/10 ● Overall length: 389mm ● Overall width: 223mm ● Overall height: 130mm ● Wheelbase: 257mm ● Tread: Front 172mm, Rear 185mm ● Minimum ground clearance: 13mm ● Weight fully equipped: approx. 1400g ● Tire width/diameter: Front 21/73mm, rear 41/82mm ● Body: High impact styrol ● Frame: Bathtub type of ABS resin. Monocoque structure when combined with the body ● Suspension: Front independent swing axle, Rear: Rigid axle with coil spring damping at all four wheels ● Sealed gear box with high performance differential Motor: 380 type (540 type optional) ● Gear ratio: 13.4:7 ● Power source: Tamiya 6V1200mAh Ni-Cd or 7.2V Ni-Cd ● Speed control: 3 step forward/reverse ● Radio Control Unit: 2 channel digital proportional (not included)



1/10th SCALE (5845) 6V-7.2V-7.2Vレーシング

45 THE HORNET
ホーネット

Light weight and high power result in superb performance and the Hornet has achieved this. The use of a tough bathtub frame/chassis of ABS resin, and a rolling/rigid rear axle have kept the weight down to a minimum. A sealed gearbox driven by the famous 540 type motor provides the power to satisfy beginner and expert alike. With many of the features of the popular Grasshopper, but with the upgrade oil filled shocks and Lexan body, the Hornet is made for the circuits.

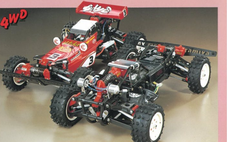
In some of the wild and desolate areas of Southern California, buggy racing was born. These fun vehicles are normally of a single seat design constructed from welded steel tubing for lightness and powered by highly tuned racing engines. Speeds of up to 200 km/h are not unusual, over rough terrain.

(Model Specifications) ● Scale: 1/10 ● Overall length: 406mm ● Overall width: 230mm ● Overall height: 150mm ● Wheelbase 251mm ● Tread: Front 172mm, rear 185mm ● Ground clearance 16mm ● Weight ready to run approx. 1430g ● Tire width/diameter Front 21/73, rear 51/88mm ● Body: Polycarbonate ● Frame/chassis ABS Resin ● Suspension: Front swing axle independent with coil damper, Rear: Rolling rigid rear axle with coil over oil filled dampers ● Sealed gearbox with competition differential ● Motor: 540 type (RS-540SD black motor optional) ● Gear ratio: 18.2 ● Speed control: 3 step forward and reverse ● Power source: Tamiya 6V, 7.2V or 7.2V Racing Pack battery required (not in kit) ● Radio control unit: 2 channel, 2 servo digital proportional required (not in kit)

47 HOTSHOT 4WD
ホットショット4WD

The Hotshot is a full time 4 wheel drive vehicle, shaft driven with dual differentials, that uses no chains, belts or pullys. Ball thrust bearings keep the shafts properly positioned for maximum performance and maintenance at a minimum. Front and rear double wishbone suspension system that provides up to 40mm of wheel travel, giving almost unbelievable stability over the roughest of surfaces. The Hotshot is easier to control during cornering and straight running than the majority of two wheel drive buggy's on the market. Twin coil over oil filled dampers are 3 way adjustable for fine tuning to all road conditions. Body flex and sway are controlled by the steel stabilizers at front and rear. Low profile tires and light weight engineering plastics give this sophisticated 4WD an all up weight of only 1700 gms.

(Model Specifications) ● Scale: 1/10 ● Overall length: 390mm ● Overall width: 235mm ● Overall height: 153mm ● Wheelbase: 262mm ● Tread: Front and rear 194mm ● Minimum ground clearance: 15mm ● Weight fully equipped: approx. 1700g ● Tire width/diameter: Front 28/82mm, Rear 34/82mm ● Body: Polycarbonate ● Frame: Monocoque frame of ABS resin ● Suspension: Front and rear dobule wishbone ● Oil damper coil spring units are mounted both front and rear ● Motor: 540 type (Black and Technigold Motors optional) ● Gear ratio: 1/8.7, 1/10.04 ● Power source: Tamiya Ni-Cd 7.2V or 7.2V racing pack (6V Ni-Cd battery available) ● Speed control: Forward 3 step and reverse 2 step ● Radio control unit 2 channel 2 servo digital proportional (not in kit)



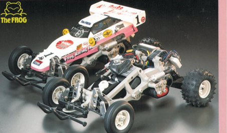
1/10th SCALE (5847) 6V・7.2V・7.2Vレーシング

41 THE FROG
マイティ・フロッグ

A high performance off road competion car with the vast majority of quality tune up parts contained in the kit. The competition 540 type motor is included along with the adjustable oil filled competition shock absorbers. Frame is the race proven ABS resin space frame, both light in weight and extremely strong. Low center of gravity, high quality differential gearing and independent suspension make for safe and durable high speed running and cornering.

About real off road cars ● High performance racing buggys can be equated with the track type F1 racers. Highly tuned engines are mounted on lightweight slim frames of steel tubing riding upon 4 wheel independent suspensions with long movement shock absorbers. Smoothly traveling over rough terrain they are a sight to behold!

(Model Specifications) ● Scale: 1/10 ● Overall length: 400mm ● Overall width: 230mm ● Overall height: 150mm ● Wheelbase: 248mm ● Tread: Front 185mm, rear 187mm ● Minimum ground clearance: 30mm ● Weight fully equipped: about1.7kg ● Tire width/diameter: Front 21/73mm, rear 51/88mm ● Body: Polycarbonate ● Frame: ABS resin space frame ● Suspension: Front/double wishbone, rear/trailing arm with adjustable shock absorber ● Differential gear installed in sealed gear case ● Motor: 540 type (540SD optional) ● Gear ratio: 1/6.7, 1/7.3, 1/8.5 ● Power source: Tamiya Ni-Cd 6V/7.2V standard battery or Ni-Cd racing pack ● Speed control: Forward/reverse 3 step ● 2 channel, 2 servo radio control required. (Batteries and radio unit not in kit.)

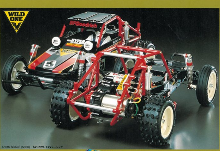


1/10th SCALE(5841) 6V・7.2V・7.2Vレーシング

50 WILD ONE
ワイルドワン

Wild and dynamic is the word for this 1/10 scale electric powered radio controlled high performance off-road racing buggy. 4 wheel independent suspension of the trailing arm type is damped by four coil over oil filled shock absorbers equipped with a free piston. Wide front and rear tread, plus a low center of gravity provides extreme stability on rough terrain with ease. Sealed gearbox houses 2 precision ball bearings and a nylon differential, and protects the high performance gearing from dust and debris during running. Sturdy ABS resin bathtub frame and roll cage protects the car from damage. The one piece wheels and polycarbonate body greatly contribute to its light weight.

(Model Specifications) ● Scale: 1/10 ● Overall length: 437mm ● Overall width: 225mm ● Overall height: 150mm ● Wheelbase: 225mm ● Tread front: 192mm, rear: 186mm ● Minimum ground clearance: 33mm ● Weight fully equipped approx. 1,760g ● Tire width/diameter: Front 23/83mm, Rear 34/82mm ● Frame: bathtub type of ABS resin ● Suspension: Front and rear trailing arm ● Sealed gearbox includes differential gears ● Motor: 540 type motor ● Gear ratio: 1/7.54, 1/9.05 ● Speed control: forward and reverse 3 steps ● Power source: Tamiya 6V, 7.2V or 7.2V racing pack Ni-Cd battery ● Radio control unit: 2 channel 2 servo digital proportional unit (not in kit)

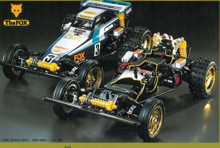


1/10th SCALE (5850) 6V·7.2V·7.2Vレーシング

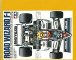
51 THE FOX
フォックス

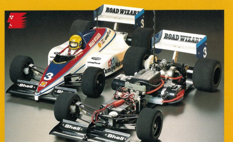
The slender styling and its swiftness is just like a fox on the run. There is no question about the fox satisfying the most discriminating R/C enthusiast. The Fox utilizes double wishbone 4 wheel independent suspension. Damper cylinders made from engineering plastics with 3 methods of piston and spring adjustment. Damper and spring can be adjusted in 3 steps providing superb road tracking ability. ABS resin monocoque type frame protects valuable mechanism from shock and debris. 8 precision ball bearings are utilized for ultimate performance on the track. The one piece wheel and polycarbonate body contributes in lightening the weight of the car. A true offroad track bred dirt racer for the discriminating enthusiast.

(Model Specifications) ● Scale: 1/10 ● Overall length: 425mm ● Overall width: 225mm ● Overall height: 133mm ● Wheelbase: 260mm ● Tread Front: 198mm, Rear: 183mm ● Minimum ground clearance: 29mm ● Weight fully equipped: 1,580g ● Tire width/diameter: Front 23/83mm, Rear 34/82mm ● Body: polycarbonate ● Frame: ABS resin monocoque type ● Suspension: Front and rear double wishbone ● Equipped with 3 coil over oil filled shocks ● Motor: 540 type motor ● Gear ratio 1/8.7, 1/7.25 ● Power source: 6V, 7.2V or 7.2V Racing Pack ● Speed control: Forward 3 and reverse 2 steps ● Control unit: 2 channel 2 servo digital proportional unit (not in kit)



1/10th SCALE (5851) 7.2V·7.2Vレーシング·6V



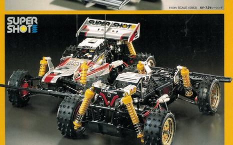


1/10th SCALE (5853) 6V・7.2Vレーシング

53 ROAD WIZARD F-1
ロードウィザードF-1

Formula one racing is the peak event in competition, and the Road Wizard F-1 racer provides the same excitement as its full sized counterpart. The body design is a Tamiya original incorporating aerodynamic features first seen in F-1 racers competing in the Grand Prix scenes. The chassis/frame is a two part 1.5mm FRP unit. Using the preferred 3 point suspension system of coil damped front wheels and a single rear coil over oil filled adjustable shock absorber at the rear, this racer combines a high top speed with positive cornering. A wire wound variable resistance speed controller, with adjustable braking, was designed for high current flow. The light and tough polycarbonate body is not only beautiful in design but also protects the car from collisions.

◄Model specifications► ●Scale 1/10 ●Overall length 385mm ●Overall width 190mm ●Overall height 87mm ●Wheelbase 250mm ●Tread Front 157.5mm, rear 150mm ●Weight fully equipped: approx. 980g ●Tire width/diameter: Front 27/55mm, rear 40/66mm ●Body: Polycarbonate ●Frame: 1.5mm FRP semi double deck type ●Ball bearing equipped rear shaft ●Suspension: Front independent coil damped unit. Rear coil over oil filled damper unit ●Motor: 540 type ●Power source: Tamiya Ni-Cd 6V/1200mAh or 7.2V Racing Pack ●Speed control: Forward variable, reverse one step ●Gear ratio: 1/3.11 ●Requires 2 channel radio control unit with BEC or standard 2 channel radio control unit and a Tamiya Battery Eliminator (Batteries and radio unit not included in kit)



1/10th SCALE (5854) 7.2Vレーシング

54 SUPERSHOT
スーパーショット

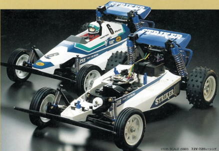
This is a radio controlled competition off road buggy with full time four wheel drive mechanics and many high performance parts for the ultimate in performance. A competition RX-540SD Technipower motor is included in the kit. Motor power is transmitted to the four wheels through a steel drive shaft with minimum friction loss, and the high grip low profile pin spike tires provides positive traction on off road terrain. The independent four wheel suspension system is of the double wishbone type and damped by four large coil over oil filled shock absorbers. A total of 24 precision ball bearings are utilized in the gearbox and drive shaft assembly for optimum performance.

◄Model specifications► ●Scale 1/10 ●Overall length 390mm ●Overall width 235mm ●Overall height 160mm ●Wheelbase 262mm ●Tread: Front and rear 194mm ●Minimum ground clearance: 20mm ●Weight fully equipped: approx. 1720g ●Tire width/diameter: Front 28/82mm, Rear 34/82mm ●Body: Polycarbonate ●Frame: Monocoque frame of ABS resin ●Suspension: Front and rear independent double wishbone type ●Oil filled damper coil spring units are mounted on front and rear ●Motor: Mabuchi RX-540SD Technipower ●Gear ratio: 5/8.7, 1/10.04 ●Power source: Tamiya Ni-Cd 7.2V Racing Pack ●Speed control: Forward 3 step and reverse 2 step ●Radio control unit: requires 2 channel 2 servo digital proportional with BEC or standard radio unit plus the Tamiya Battery Eliminator (Batteries and radio unit not included in kit)

61 STRIKER
ストライカー

This is an economically priced high performance off road racer that offers super styling and performance and is ideal for anyone just stepping into this exciting field of radio control buggy racing. The light and sturdy bathtub type frame/chassis is injection molded allowing easy access to your R/C unit. The front independent suspension is a swing axle type while the rear independent suspension is a semi trailing type. The sealed gear box houses differential gearing for smooth cornering. The sturdy injection molded body has a sharp wind cheating, Formula type silhouette that stands out at the track. Designed for rugged use, low maintenance and lots of enjoyment in the wilds.

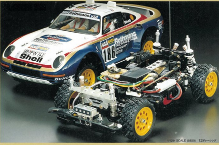
(Model Specifications) ●Scale 1/10 ●Overall length 435mm ●Overall width 232mm ●Overall height 137mm ●Wheelbase 265mm ●Tread Front 190mm, Rear 196mm ●Minimum ground clearance 30mm ●Weight fully equipped Approx. 1,460gms ●Tire width/diameter Front 20/74mm, Rear 37/80mm ●Body Impact resistant styrene ●Frame Engineering plastic bathtub type ●Suspension Front swing axle, Rear semi trailing ●Sealed gear box and differential gearing ●Motor 540 type ●Gear ratio 1:8.17 ●Power source Tamiya Ni-Cd 7.2V Racing Pack or 7.2V battery (not in kit) ●Speed control Forward and reverse 3 steps ●Control unit 2 channel 2 servo digital proportional unit (not in kit)


1/10th SCALE (5861) 7.2V・7.2Vレーシング

59 PORSCHE 959
ポルシェ 959

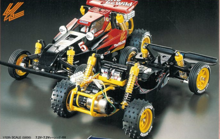
The 1986 Paris-Dakar Rally saw Porsche 959's taking first and second places, in the 4 wheel drive category, while powered by Porsche's original turbocharged flat 6 cylinder engine that produces 450hp. Tamiya's radio controlled 959 was designed with a rally concept, for on or off road running. It incorporates a midship mounted motor and shaft driven, full-time, 4WD mechanics. Front and rear independent double wishbone suspension is made from polycarbonate and is damped with oil filled shock units. Kit includes 10 precision ball bearings. Headlights are operable for realism. The blow molded polycarbonate body is highly detailed. The new low profile rubber like semi-pneumatic tires have the rally tread and pattern. Optional slick type tires are available for hard surface running.

(Model Specification) ●Scale 1/12 ●Overall length 381mm ●Overall width 172mm ●Overall height 133mm ●Wheelbase 211mm ●Tread Front and rear 136mm ●Minimum ground clearance 25mm ●Weight ready to run Approximately 1680gms ●Tire width/diameter 26/70mm ●Body Blow molded polycarbonate ●Frame Engineering plastic monocoque type ●Suspension Four wheel independent double wishbone with oil filled damper units ●Front and rear sealed gear boxes with differentials ●Motor RX-540VZ Technigold ●Gear ratio 1:5.9, 1:5.1 ●Speed control Forward/reverse 3 step ●Power source Tamiya Ni-Cd 7.2V *Racing Pack* battery (not in kit) ●2 channel 2 servo radio control unit required (not in kit)


1/12th SCALE (5859) 7.2Vレーシング

6
BFGoodrich
"SHAKEY" ROOF
STRIKER
HYPER

Shell
Rothmans
PORSCHE
DUNLOP
BILSTEIN
V.S.D
NABA
186
RECARO
Shell
DUNLOP
BILSTEIN



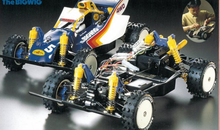
1/10th SCALE (5856) **7.2V・7.2Vレーシング・6V**

56 THE FALCON
ファルコン

When you're searching for your first radio controlled car that is economically priced and has the offerings of a high performing competitor, the Falcon is the one for you. The body and wing of the Falcon are made from light and tough polycarbonate. The special box type chassis/frame is not only light and tough, but allows easy access to your R/C unit for adjustments. The front double wishbone and rear trailing arm four wheel independent suspension matched to four, large capacity, coil over oil filled shock absorbers provide excellent stability on rough terrain. Pick up this lightweight warrior inspired by that great bird of prey, and go game hunting on the track.

(Model Specifications) ● Scale 1/10 ● Overall length: 458mm ● Overall width: 226mm ● Overall height: 150mm ● Wheel base: 263mm ● Tread front: 192mm, rear: 188mm ● Minimum ground clearance: 26mm ● Weight fully equipped: 1,580gms ● Tire width/diameter: front 20/74mm, rear 37/80mm ● Body: polycarbonate ● Frame: ABS resin bathtub type ● Suspension: front/double wishbone, rear/trailing arm. Equipped with 4 coil over oil filled shocks ● Sealed gear box with differentials ● Motor: 540 type motor ● Gear ratio: 1/8.17 ● Power source: 7.2V Racing Pack, 7.2V, 6V battery ● Speed control: 3 step forward and reverse ● Control unit: 2 channel 2 servo digital proportional unit (not in kit)

Body design: Takuya Yura



1/10th SCALE (5857) **8.4Vゴールドパワー・7.2V・7.2Vレーシング・6V**

57 THE BIGWIG 4WD
ビッグウィッグ4WD

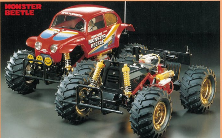
Japan's leading racing car designer Takuya Yura designed the body for this model in commemoration of Tamiya's 10th year in radio control car development. The wide body based on Yura's aerodynamic concept is a huge wing itself which helps the car stick to the road, plus the large rear wing that provides downforce, providing unbelievable stability on rough tracks. The shaft driven full time 4wd system and the sealed gear box, with differentials, transmits motor power to all 4 wheels efficiently through a steel drive shaft with minimum of friction loss. Rack and pinion steering and four wheel double wishbone type suspension using 4 coil over oil filled shock absorbers, assure crisp response on extremely rough terrain. A dream car on the track.

(Model Specifications) ● Scale 1/10 ● Overall length: 390mm ● Overall width: 234mm ● Overall height: 163mm ● Wheel base: 264mm ● Tread front: 198mm, rear 194mm ● Minimum ground clearance: 20mm ● Weight fully equipped: 1,750gms ● Tire width/diameter: front 30/80mm, rear 38/88mm ● Body: Polycarbonate ● Frame: ABS resin bathtub type ● Suspension: front/rear double wishbone ● Equipped with 4 coil over oil filled shocks ● Motor: RX-540VZ Technigold motor ● Gear ratio: 1/8.7, 1/10.04 ● Power source: 6V, 7.2V, 7.2V Racing Pack, 8.4V Gold Power ● Speed control: 3 step forward and reverse 2 ● Control unit: 2 channel 2 servo digital proportional unit (not in kit)

60 MONSTER BEETLE モンスタービートル

This is a custom, high rise, Volkswagen Beetle radio control off road buggy. The tall and humorous features of this car stand out on or off the track. The high performance competition 540 type motor is included along with the adjustable oil filled competition shock absorbers. Chassis is the race proven ABS resin space frame, light in weight and extremely sturdy. Low center of gravity, high quality differential gearing and front double wishbone suspension. The trailing arm rear suspension is matched to oversized rubber like semi-pneumatic tires enabling the car to perform on any road conditions. This is a surprising vehicle with the edge on performance.

(Model Specification) ●Scale 1/10 ●Overall length 410mm ●Overall width 290mm ●Overall height 240mm ●Wheelbase 246mm ●Tread front 225mm, rear 225mm ●Minimum ground clearance 45mm ●Weight ready to run Approximately 2220gms ●Tire width/diameter 60/130mm ●Body High impact styrene ●Frame ABS resin space frame ●Suspension Front/double wishbone, rear/trailing arm with adjustable oil filled shock absorber ●Differential gear installed in sealed gear box ●Motor 540 type ●Gear ratio 1/14.1 ●Power source Tamiya Ni-Cd 6V, 7.2V regular and 7.2V Racing Pack battery (not in kit) ●Speed control Forward/reverse 3 step ●2 channel 2 servo radio control required (not in kit)

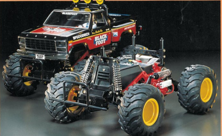


1/10th SCALE (5860) 7.2V・7.2Vレーシング・6V

58 FORD F-150 RANGER BLACKFOOT ブラックフット

There are many manufacturers on the west coast of the United States producing modification kits and accessories for customizing the popular pickup trucks used by the outdoor sportsman who's in it for the action. Extended shackles, oversize wheels and tires, beefed up shock absorbers, powerful engines plus original paint jobs convert these everyday pickups into custom made dirt monsters for stomping about the area. The Blackfoot has the looks and action of these customized pickups. Track proven space type frame of engineering plastic, 540 type motor, and sealed gear box with differential are standard equipment on this highly versatile radio control car. With the 125mm large diameter tires, it can handle the rough stuff.

(Model Specifications) ● Scale 1/10 ● Overall length 440mm ● Overall width 290mm ● Overall height 270mm ● Wheel base 246mm ● Tread front/rear 225mm ● Maximum ground clearance 45mm ● Weight fully equipped 2,220gms ● Front and rear tire width/diameter 60/125mm ● Body High impact styrene ● Frame ABS resin space frame ● Suspension front/double wishbone rear/trailing arm with coil spring damped shocks ● Sealed gear box differentials ● Motor 540 type motor ● Gear ratio 1/14.1 ● Speed control 3 step forward/reverse ● Control unit 2 channel 2 servo digital proportional unit (not in kit)

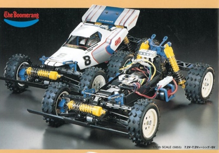


1/10th SCALE (5858) 7.2V・7.2Vレーシング・6V

55 THE BOOMERANG
ブーメラン 4WD

This is an economically priced high performance off road racer utilizing 4wd mechanics, that are suitable for anyone starting up this class for the first time. The mechanics of the Boomerang are the latest state of the art, in shaft driven full time four wheel drive systems, and each gear box has its own differential. Motor power is transmitted to the four wheels efficiently through a steel drive shaft with a minimum of friction loss. Four wheel independent suspension is of the double wishbone type damped by a monoshock in front and two rear coil over oil filled shock absorbers, that assure great stability over extremely rough terrain. The aero styling, inspired by the Boomerang hunting weapon, helps the car whiz over dirt tracks.

(Model Specifications) ● Scale 1/10 ● Overall length: 390mm ● Overall width: 234mm ● Overall height: 153mm ● Wheel base 262mm ● Tread front: 196mm rear: 194mm ● Minimum ground clearance 22mm ● Weight fully equipped approx. 1,650gms ● Tire width/diameter: front 30/88mm rear 38/88mm ● Body: polycarbonate ● Frame: ABS resin bathtub type ● Suspension: front and rear double wishbone ● Equipped with 3 coil over oil filled shocks ● Motor: 540 type motor ● Gear ratio 1/8.7, 1/10.04 ● Power source 6V, 7.2V, 7.2V Racing Pack ● Speed control: 3 step forward and reverse ● Control unit: 2 channel 2 servo digital proportional unit (not in kit)



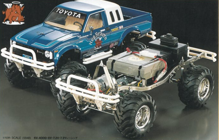
1/10th SCALE (5855) 7.2V・7.2Vレーシング・6V

48 TOYOTA 4×4 PICKUP BRUISER
トヨタ・ハイラックス4WDハイリフト

This sophisticated R/C vehicle uses a three speed gearbox that is shifted via the transmitter for powerful four wheel drive in first gear, a two wheel drive at medium speed in 2nd gear and 2 wheel high speed running in 3rd gear. The gearbox comes factory assembled and the remaining components of the vehicle assemble much like the full sized Toyota. Huge tires and the powerful high torque RS-750SH motor provide spectacular performance for the good looking pick-up truck.

About the real vehicles ● 4 wheel drive pick-up trucks have been popular with the outdoor enthusiasts for years and many of these types of vehicles have been modified for racing and sporting events. One event called the "Mud Bog Race" is done in a muddy bog and is very exciting to watch.

(Model Specifications) ● Scale 1/10 ● Overall length: 520mm ● Overall width: 278mm ● Tread: Front 200mm, rear 218mm ● Minimum ground clearance: 35mm ● Weight fully equipped: approx. 4.7kg (installation of Tamiya Ni-Cd 6V-4000mAh) ● Tire diameter/width: 125/66mm ● Body: High impact styrol ● Frame: Steel ladder frame ● Suspension: Rigid axle leaf spring with oil damper ● Sealed mechanism box and gear box ● Motor: RS-750SH ● 3 step gear change by operating R/C transmitter, 4 wheel drive in low speed ● Front wheels with free wheel hub ● 3 step speed controller ● Power source: Tamiya Ni-Cd 6V-4000mAh, 6V, 7.2V1200mAh or 7.2V Racing Pack ● Radio control unit: 4 channel and 3 servo radio control unit. (not included)



1/10th SCALE (5848) 6V-4000・6V-7.2V・7.2Vレーシング

8
4WD
8

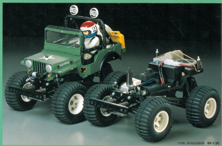
Hog Heaven

35 WILD WILLY

ワイルド・ウイリス

A new concept in radio control off road enjoyment. A truely versatile stunt vehicle that makes spin turns, jump turns and wheelies with ease. Body styling is from the famous "Jeep", which is now utilized by auto sports fans for racing and hill climbing. High strength nylon, ABS resins and injected molded plastics are used in its construction for lasting durability. Precision ball bearings are employed in the system to ensure smooth running. A large differential gear and sealed mechanism box allows running in all types of weather. Large sand type tires and coil spring suspension dampen out all of the rough terrain surfaces. With a realistic driver figure of Wild Willy.

(Model Specifications) ● Scale: 1/10 ● Overall length: 343mm ● Overall width: 242mm ● Overall height: 268mm ● Wheelbase: 165mm ● Tread: Front 166mm; Rear 196mm ● Minimum ground clearance: 30mm (without differential gear case) ● Weight fully equipped: 2.6kg ● Tire width/diameter: Front/rear 46/103mm ● Body: High impact styrol ● Frame: ABS resin ● Suspension: Front swing axle, Rear trailing link ● Ball bearings utilized on front and rear axles ● With differential gear ● Sealed mechanism box ● Motor: 540 type ● Gear ratio: 1/11 ● Tamiya Ni-Cd 7.2V battery; Tamiya Ni-Cd 6V battery available (not included) ● Speed control: Forward/reverse 3 step ● Radio control unit: 2 channel digital proportional (not included)



1/10th SCALE(5809) 6V-7.2V

PANZERKAMPFWAGEN VI. TIGER II (Sd.Kfz.182) Ausf.B
GERMAN HEAVY TANK TYPE VI
KING TIGER

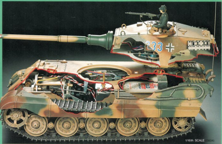
4 GERMAN HEAVY TANK KING TIGER

ドイツ重戦車キングタイガー

An exact 1/16 scale radio controlled model of the famous German King Tiger tank, said to have been the finest overall combat tank during world war 2. Model will accept up to four channels of radio control for turret rotation and gun flashing light. A minimum of two channels is required for operation. Individually linked with metal rods, the catapiller tracks are made from a new type of plastic for long life and ease of maintenance. Chassis and suspension system is of heavy duty aluminium and cast metal.

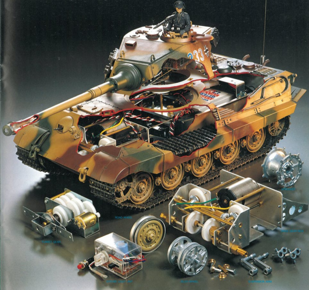
About the prototype ● Entering the front liens late in 1944, the German King Tiger tank was regarded as the most formidable battle tank to be introduced during the conflict. Mounting the well known 88mm, model 48 gun, plus two 7.62mm machine guns, and powered by a Maybach, water cooled, V12 engine, this tank had a top speed of 14-19km/h. A total of 487 King Tigers were produced during the war.

(Model specifications) ● Scale: 1/16 ● Overall length: 640mm ● Overall width: 236mm ● Overall height: 195mm ● Utilizes a heavy duty aluminium chassis with torsion bar suspension ● Requires a 2-4 channel radio and a Tamiya 7.2V Racing Pack for power ● Servo controlled 360 degree turret rotation and gun flashing ● Strobe unit contained in kit ● Factory assembled, twin clutch drive unit with heavy duty gears. (Battery and R/C unit are not included in kit)



1/16th SCALE (5604)

*The Tamiya Sealed Battery is no longer in production. Use the Tamiya Ni-Cd 7.2V Racing Pack for running power.


SPROCKET
ROAD WHEEL
MAIN GEAR BOX
TURRET GEAR
LIGHT UNIT
IDLER WHEEL
SUSPENSION ARM

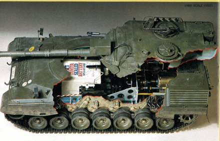
2 WEST GERMAN LEOPARD A4

西ドイツ・レオパルドA4戦車

This is a model of the West German latest tank. You will be satisfied with its excellent mobility on rough surfaces. It is a challenge to work on such exquisite mechanisms as the drive train with a dual clutch and independent suspension system with torsion plates. Also the precisely detailed scale model is very appealing when it is completed.

About the prototype ● The newest improved type of West German Leopard tank is the A4 which is one of the most formidable combat vehicles of the world. The spaced armour on the turret (double shells) gives it excellent defensive characteristics and the computerised firing control system linked with its main 105mm gun augments the offensive power of the tank.

(Model Specifications) ● Scale: 1/16 ● Overall length: 600mm ● Overall width: 216mm ● Overall height: 167mm ● Minimum ground clearance: 28mm ● Weight fully equipped: about 4kg ● Body: Styrene resin ● Frame: duralumin ● Motor power is transmitted through clutches. The tank can be made to run in either forward or reverse direction and simultaneously steer left or right ● Linked metal tracks ● All road wheels independent suspension systems with torsion plates and die cast suspension with stainless steel springs for prototypical operation ● Motor: 540 type ● Gear ratio: 1/26.7 ● Power source: 7.2V Racing Pack ● Radio control system to be used: 2 channel proportional (not included) ● Tank can climb a 40 degree incline.


1/16th SCALE (5602)

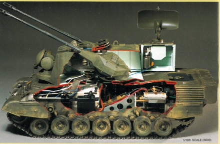
3 WEST GERMAN GEPARD

西ドイツ・ゲパルト対空戦車

This is a radio controlled model which can be enjoyed not only because of its dynamic maneuverability, but also because of the many unique mechanics. The turret revolves 360°, the twin guns move up and down, and the radar at the rear revolves with the movement of the turret. The tank performs pivot turns and gradual turns through a drive unit utilizing a double clutch. All wheels have individual suspension with torsion plates making it like the prototype.

About the prototype ● The West German Gepard is the newest self propelled anti aircraft gun. It is basically the Leopard, a West German master piece tank, with the ordinary turret replaced by a larger turret with twin 35mm anti aircraft guns which are operated under a superb firing control system which is coupled with a computer and highly advance radars. It is capable of intercepting enemy airplanes flying at super sonic speed and at low altitudes.

(Model Specifications) ● Scale: 1/16 ● Overall length: 495mm ● Overall width: 216mm ● Overall height: 256mm ● Minimum ground clearance: 28mm ● Weight fully equipped: about 5kg ● Body: Styrene resin ● Frame: duralumin ● Drive unit system: Twin clutch mechanism, forward/reverse, pivot and gradual turning ● Turret revolution: 360°, guns movement: up and down, rear radar rotation ● Linked metal tracks ● Radio control system used: 2 channel proportional system is minimum requirement (not included) ● Power source Tamiya 7.2V Racing Pack

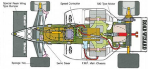

1/16th SCALE (5603)

*The Tamiya Sealed Battery is no longer in production. Use the Tamiya Ni-Cd 7.2V Racing Pack for running power

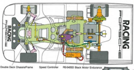
WEST GERMAN FLAKPANZER GEPARD (5603)
1/16th SCALE RADIO CONTROL

WEST GERMAN LEOPARD A4 (5602)
1/16th SCALE RADIO CONTROL

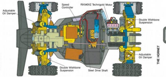
GERMAN HEAVY TANK KING TIGER (5604)
1/16th SCALE RADIO CONTROL



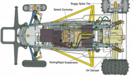
ROAD WIZARD F-1



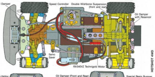
PORSCHE 956 RACING MASTER Mk.5


Adjustable Oil Damper
Speed Controller
RX-540VZ Technigold Motor
Double Wishbone Suspension
Adjustable Oil Damper
Double Wishbone Suspension
Steel Drive Shaft

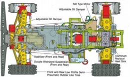
THE BIGWIG



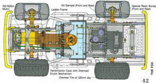
THE HORNET


Oil Damper
Speed Controller
Double Wishbone Suspension (front and rear)
Oil Damper with Reservoir
Servo Saver
RX-540VZ Technigold Motor

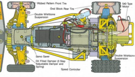
PORSCHE 959 (PARIS-DAKAR RALLY WINNER)


540 Type Motor
Adjustable Oil Damper
Adjustable Oil Damper
Stabilizer (Front and Rear)
Double Wishbone Suspension (Front and Rear)
Aluminum Resistor Heat Sink
Front and Rear Low Profile Semi-Pneumatic Rubber Like Tires

HOTSHOT 4WD

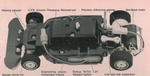

RS-7505H Motor
Ladder Frame
Oil Damper (Front and Rear)
Special Resin Bumper (Front and Rear)
Transmission Case with Overload Clutch Mechanism
Oversize Tire of 125mm dia.

TOYOTA 4×4 PICKUP BRUISER


Ribbed Pattern Front Tire
Oval Block Rear Tire
540 Type Motor
Double Wishbone Suspension
Servo Saver
Oil Filled Damper (3 Step Adjustable Damper and Spring)
Speed Controller
Double Wishbone Suspension

THE FOX

R/C GUIDE FOR TAMTECH


Steering adjuster
C.P.R. (Control Processing Receiver) unit
Precision differential gearing
Mini-Black motor
Sponge racing tire
Engineering plastic monocoque chassis
Tamiya Ni-Cd 7.2V Tampack battery
Link type rear suspension

The 1/24 scale Tamtech R/C series car models are designed for radio control operation, to provide the modeler with the thrill and satisfaction of building and controlling a precision scale miniature model. These 1/24 scale radio control cars are only half the size of 1/12 scale models and have an overall length of about 20cm and width of 8cm. The compact size requires only a minimum of space for running in or outdoors.

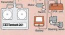
TAMTECH R/C SYSTEMS

The Tamtech radio control car series has all of the necessary equipment, including radio control unit and Ni-Cd battery which were designed just for this series. When you're new to the hobby it's nice to know that you have components that work together and not just what the hobby shop dealer might want you to buy. The Complete Kit contains the R/C unit, Ni-Cd battery and charger, and the genuine Tamtech quality spare parts will keep the car's performance like new. The Car Only kit, R/C unit, replacement tires, motor, body parts, decals, etc. are available for routine maintenance.

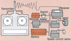
ABOUT THE TAMTECH R/C UNIT

The Tamtech 201 two channel digital proportional radio control system was developed to provide the highest standard of performance for these radio controlled cars. The amplifier boosted electronic speed controller and receiver are combined as part of the C.P.R. (Control Processing Receiver) unit, which obtains its power from the Tampack Ni-Cd running battery. The normal two channel two servo configuration is not seen in this radio control system, since the amplifier operated speed controller and receiver are combined as one unit. Only the steering servo can be recognized in the Tamtech 201 R/C unit. All of the connectors are prewired, eliminating tedious wiring chores. Even the steering servo is prewired to the unit.

TAMTECH 201 R/C UNIT COMPONENTS



NORMAL R/C UNIT

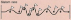


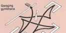
Worries about overheating the speed control heat sinks are done away with. The amplifier operated speed controller allows continuous running, fast or slow, without overheating problems. The speed control is a forward/reverse variable type, providing all of the excitement expected from the compact size of the car. Its amazing agility provides lots of versatility and amusement for everyone. The R/C unit frequency crystals are easily interchangeable and different frequencies are presently available enabling you to race in groups.

HAVING FUN WITH TAMTECH R/C

The Tamtech 1/24 radio control cars are only half the size of 1/12 scale models and have an overall length of about 20cm, and a width of about 8cm. This compact size requires a minimum of space for running as compared to the larger radio controlled cars. Crisp handling is matched to a turning diameter of only 30cm, plus smooth acceleration built within the car provides the utmost performance and control at the track.

Timed, speed, and gymkhana racing are some of the ways you can enjoy the Tamtech radio controlled cars.





● SUITABLE RUNNING SURFACES

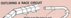
The Tamtech radio controlled cars can be run on thin carpet, wooden floors, asphalt or concrete pavement. The racing sponge tires used on the Tamtech R/C cars are designed to provide excellent grip and traction on these types of running surfaces.

● UNSUITABLE RUNNING SURFACES

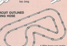
Good running performance is difficult to obtain on slippery surfaces such as hard or vinyl tiled floors. Also avoid running the car on surfaces that will impose too much of a load on the running components, such as thick carpet, bed covers, and soft sandy areas.

The easiest way to make a race circuit is by outlining the course using vinyl tape, if the track is on carpet or a wooden floor. Outline by using chalk if its on asphalt or concrete. If you want more sophistication in your racing circuit, use a hose or square lumber of about 2 x 2cm in size to fence off the circuit. Make sure to securely tape down the fence to avoid car bumpers getting stuck underneath the fence. Also remember to use tape that is weak in adhesive or you'll have a clean up mess at the end of your racing day. Don't forget to wipe off the chalk lines from the pavement too. Always construct the race track on a flat, hard surfaced area.

OUTLINING A RACE CIRCUIT



CIRCUIT OUTLINED USING HOSE



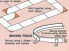
MAKING A RACING CIRCUIT INDOORS

Living room space is all you need to have competition races. If you want to organize indoor race competition, a 90 - 150cm width, 8 - 15m lap length race circuit will be more than enough space for competition excitement. You don't even have to worry about bad weather, day or night, when you're indoors. The Tamtech 1/24 scale R/C cars can also serve as practice vehicles for the larger radio controlled cars since they can be run at any time desired. Use them to train and keep your driving skills in top condition. With the Tamtech, you can have radio control excitement 24 hours a day.

FOR MORE SOPHISTICATION IN YOUR RACING CIRCUIT

Here are some tips in constructing a more sophisticated race circuit. Use sheets of plywood 5mm thick and lay them out as shown. Cover the track using thin layers of carpet for better gripping of the sponge tires.

RACE CIRCUIT MADE OF PLYWOOD


Thin layer of carpet
Hold together using cloth tapes
MAKING FENCE
Secure bracket to fence using double sided tape.
Secure using L shape brackets and screws.

Construct fence using a flexible polyvinyl railing and secure it with double sided tape, wood screws and L shaped brackets, as shown. Though this will be a more costly project, you will have the satisfaction of owning a race circuit of your own.

TIPS FOR CIRCUIT LAYOUT

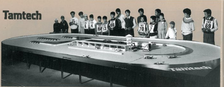
A circuit that's too long, short, narrow or wide will spoil the excitement of racing the Tamtech R/C cars. The track width should be at least 80 - 150cm, and should have a straight running stretch for at least 8 - 20m to allow the car to run at maximum speed. The basic layout can be as seen at larger radio control car circuits, but be careful not to make the layout too complex or too plain. The race circuit should include high speed corners, "S" turns, and hair pin curves, to test driving skills. Design the racing circuit with the driver's vision in mind. If you are planning on organizing races allow plenty of room for at least six speeding racers.

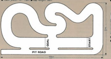
PRODUCE AN ACTION DIORAMA

Additional timing towers, pit stalls, sponsor advertisements, and other 1/24 scale car models set around the area can convert the Tamtech race circuit into a beautiful and functional racing diorama. The Tamtech 1/24 scale chassis can be fitted with many of the 1/24 scale model bodies already available from Tamiya, such as the Mercedes-Benz 500SEC, BMW M635CSi and Testarossa. These bodies can be fitted with only minor modifications. Others can also be fitted if the wheel base and tread match up. A life like, action packed, diorama using the Tamtech R/C cars is really not that difficult to do.

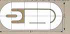
● WHEN USING SLOT CAR CIRCUITS

The Tamtech 1/24 scale radio control cars can even be run on the old slot car circuits. The cars will perform smoothly over the slots, reliving the slot car racing boom. Just remember to completely disconnect the electronics from the slot car unit, as they are no longer required. If the plug is left connected, it could cause radio interference.



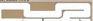


TAMIYA-TAMTECH OUTDOOR R/C CIRCUIT
● Track width: 1.5 - 1.8m ● Lap length: 53m



TAMIYA-TAMTECH INDOOR R/C CIRCUIT
● Track width: 0.45 - 0.85m ● Lap length: 23m (photo above)

CIRCUIT LAYOUT DESIGN TYPE A
● 3.6 x 3.6m



CIRCUIT LAYOUT DESIGN TYPE B
● 3 x 12m

● CAUTIONS FOR RUNNING INDOORS

Running the car in rooms that have metal reinforced walls, could also result in radio interference problems. Old blinking fluorescent lamps, computers, television, and electrical appliances like air conditioners using large motors may also interfere with some frequencies. Avoid running the cars in these environments.

● CONVERTING 1/24 SCALE MODELS INTO R/C CARS

The 1/24 scale model cars are popular all over the world because of their size and details. The Tamtech 1/24 scale car chassis can be used to convert many of these models into R/C vehicles. The wheel base and tread should be close to the chassis dimensions. Tamiya's Mercedes-Benz 500SEC, BMW M635CSi and the Ferrari Testarossa fit with only minor modifications.

BODIES THAT ARE SUITABLE FOR MODIFICATION

If most of the dimensions between the Tamtech radio controlled car chassis and the body are the same, only a minor modification is necessary to fit the body. Refer to the dimensions shown.

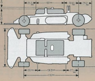
● GET THE WHEELBASE RIGHT

The Tamtech chassis can accept up to 5mm differences in the wheelbase. Cut or sand off the intervening wheel arch on the fender to match the wheel.

● WHEN TREAD IS TOO WIDE

When the tread is too wide and the tires are extending out too much from the fender, add extensions to the fender arches or attach blistered fenders using plastic sheet to smooth out the contours of the body.

TAMTECH CHASSIS DIMENSIONS



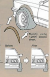
● WATCH THE HEIGHT OF THE C.P.R. UNIT

Check out body by fitting it to the Tamtech R/C car chassis with the C.P.R. unit mounted prior to deciding on the modification. Some cars with aerodynamic body styling have a low hood and rapidly sloped windshield which will get in the way of the C.P.R. unit. If the problem is slight, the chassis can be attached slightly rearward for a better fit.

MOUNTING THE C.P.R. UNIT SIDEWAYS

Certain bodies can be easily fitted when the

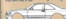
MAKING FLARED FENDERS
BMW M635CSi

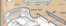

Modify using 1.2mm plastic sheet.
Before
After

EXAMPLES

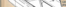
WHEN USING THE TAMIYA 1/24 SCALE MERCEDES-BENZ 500SEC BODY

Make 6mm hole in roof.

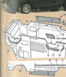




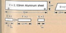
REQUIRED PLASTIC PARTS (1/2 size)



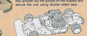
WHEN USING THE TAMIYA 1/24 SCALE TOYOTA HIACE QUICK DELIVERY BODY



REQUIRED PARTS



C.P.R. unit is mounted sideways. When doing this, smooth out the bumps on the chassis and secure the unit using double sided tape.



Apply double sided tape to the edge of chassis.

● REMODELING OR SCRATCH BUILDING A BODY

The compact size of Tamtech cars enable you to do your own body designing with ease. You can do major remodeling on a kit body or build one from scratch. With Tamtech radio control cars, your sought after dream car can be a reality. Refer to the Original Car Body page in this book and accomplish your designing desires. Spend time at the drawing board, select the right materials to use and build that one-of-a-kind vehicle.

TUNING

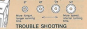
Tamtech radio controlled cars have two vital tuning points that enhance the overall performance of the car on differing road conditions.

① FRONT SUSPENSION

The Tamtech radio controlled car's front suspension is a sophisticated independent coil damped type. The silver coil springs included in the kit are the normal type while the black are the soft type. Using the soft type provides quicker steering (oversteering characteristics).

② PINION GEAR

The Tamtech radio controlled car was designed for both in and outdoors. Therefore, you will find within the kit, four different pinion gears for altering car performance to track conditions. 8T, 10T, 12T, and 14T pinion gears are included. The more teeth, the higher the maximum speed, but weaker acceleration and shorter running time. A smaller pinion gear will provide the opposite performance with a lower top speed, but faster acceleration and a longer running time. When running indoors or in a racing circuit with many corners, use of the smaller pinion gears is recommended.


Technical race circuit
High speed race circuit
8T
10T
12T
14T
More torque, longer running time.
More speed, shorter running time.

TROUBLE SHOOTING

● WHEN CAR DOES NOT STOP OR RUNS AWAY WHEN CONNECTING BATTERY.

① Is the speed control trim on the transmitter properly adjusted? Adjust trim lever to stop position of the car.

② Set neutral lever to the normal position.

③ When adjustments can not be accomplished at the transmitter, adjust motor neutral adjuster trim on the C.P.R. unit.

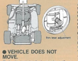
● CAR DOES NOT RUN STRAIGHT.

① Is the steering control trim on the transmitter properly adjusted? Adjust trim so car runs straight with stick at neutral.

ADJUSTING STEERING

★Adjust by running car on flat surface.
★Keep steering control stick in neutral.
★When car runs to the right, slide trim lever to left for adjustment.
★When car runs to the left, slide trim lever to right for adjustment.

② When adjustment can not be accomplished at the transmitter, readjust servo horn and tie-rod length.



trim lever adjustment

● VEHICLE DOES NOT MOVE.

① Are the batteries fresh or recharged?

② Are all connectors properly plugged in?

③ Do the wheels rotate smoothly? Are the gears meshed properly? A differential and pinion gear meshed improperly hinders rear wheel rotation, activating the heat protector installed in the speed control amplifier. This cuts off current flow temporarily.

● UNSTABLE CONTROL OF THE CAR.

① Are the batteries in the transmitter fresh?

② Check for possible radio interference from another source.

③ Is the noise suppression condenser on the motor disconnected?

● WHEN THE HEAT PROTECTOR ACTIVATES.

The heat protector installed in the C.P.R. unit protects the speed control amplifier from over load by temporarily cutting off the current flow. Continuously imposing too much of a load, will destroy the speed control amplifier. Follow the instructions outlined below.

① Avoid running on thick carpet, bed covers, gravel and soft sand areas.

② Never hinder rotation of wheels while running.

③ Do not attempt to run car when it is stuck.

④ Avoid pulling loads or steep uphill climbing.

⑤ Remove all dirt and debris from shaft and gears.

⑥ Never run car when differential and gears are not meshing properly.

● WHAT TO DO WHEN HEAT PROTECTOR ACTIVATES.

When your car suddenly stops running, there is a possibility that the heat protector has activated. Immediately shut off receiver and check for cause. Correct problem and wait 15 minutes before turning on the receiver again to run car.

● OBSERVE THE FOLLOWING CAUTIONS.

Digital proportional units use the latest in electronic technology. Follow the instructions outlined below to avoid damage.

① Avoid short circuits.
Worn insulation on the wiring can result in a short circuit, destroying battery and C.P.R. unit. Properly insulate worn cables using vinyl tape.

② Connecting plugs.
The connectors can only be joined together in one way. DO NOT USE FORCE! If they don't fit perfectly together, do not attempt to use force or it can ruin the C.P.R. unit.

③ Avoid running in standing water and rain. The C.P.R. unit and servo uses the latest in electronic technology. Avoid using the unit in wet or damp areas. Also be careful not to drop it. Take the utmost care when handling the unit. If the C.P.R. unit should accidentally get wet, immediately disconnect battery, clean and dry thoroughly, using a heat dryer. Consult with the manufacturer if loss of control should occur.

● MAINTENANCE AFTER RUNNING.

★Use a brush and clean dry rags to completely remove sand, dirt, etc., and apply grease to gears and suspension.
★Avoid using water, detergent, or spray oils for cleaning the car.
★Consult with the manufacturer for repairs.

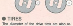
CHARACTERIZING A CAR

There are a variety of car characters: fast cars, cars with excellent acceleration, cars with good cornering capability, and so forth. Cars assembled from kits come out diversified in quality because they are built up through the assembler's own techniques. Build your car in your own way. The most apparent characterizations are formed in the gear ratio and the steering characteristics.

1. MAXIMUM SPEED AND ACCELERATION CAPABILITIES (GEAR RATIO AND SPEED)

At a given output power of the motor, the maximum speed and acceleration capabilities are determined by the gear ratio. With electric cars, the relation of the pinion gear on the motor shaft to the gear of the rear axle is important. You will have a higher gear ratio with a smaller pinion gear (smaller number of teeth) and a larger gear on the rear axle. The opposite makes a low gear ratio. With a high gear ratio, the car has a better acceleration capability, but a limited maximum speed. A car with a low gear ratio has poor acceleration but a higher maximum speed.

A car with high gear ratio is suitable for a technical course which is built with hair pin curves demanding low speed driving, while a car with a low gear ratio is for a speed course consisting of longer straightaways and curves of longer radii.

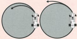


● TIRES

The diameter of the drive tires are also related to the speed and acceleration characteristics. The larger the diameter of the drive tires are, the higher the speed of the car will develop within certain limitations.

2. UNDER STEERING AND OVER STEERING (STEERING TENDENCY)

When the steering wheel is turned, the car will also turn in the same direction. However, most cars have the tendency to turn excessively or inadequately. These characteristics are called steering traits. Cars that turn excessively have over steering traits and the others have under steering traits. Cars that turn in close proportion to the control have neutral steering. This is hardly achieved except with cars that are running at a low speed.



● STEERING WHICH IS EASY TO CONTROL

A car with slight under steering is easy to drive. A car with over steering will spin when taking corners at a high speed. Even on a straight course, it is unstable. An under steering car has difficulty making sharp turns, and at a high speed it may not be able to take corners and could leave the course. In either case, excessive steering makes a car difficult to control.

● FACTORS TO DETERMINE STEERING CHARACTERISTICS

The steering characteristics are affected by the difference between the traction of the front and rear tires. When the traction of the front tires is greater than that of the rear tires, the result is over steering. The opposite condition causes under steering. Therefore, adjust the traction of the rear tires so that it is a little greater. You will then attain a slight degree of under steering.

The traction of a tire is determined by the weight it carries, by the area of contact of the tires on the road surface, and by the softness of the tire surface. The heavier the weight a tire carries, the larger the contact area becomes, and the softer a tire is, the greater the traction becomes with certain limitations.

● ADJUSTMENT OF STEERING CHARACTERISTICS

★DECREASING OVER STEERING

(1) Place a heavy load, such as batteries, at rear portion of the car.

(2) Replace the rear tires with larger ones or replace the front tires with smaller ones.

(3) Replace only the rear tires with sponge tires.

★DECREASING UNDER STEERING

(1) Place a heavy load at the front of the car.

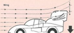
(2) Install front tires that are larger.

(3) Replace only the front tires with sponge tires.

These three remedies are the basic ways to change steering characteristics. The traction of cars with suspension systems can be increased by decreasing suspension spring tension. 30% -40% of the car's full weight should be on the front wheels and 70% -60% on the rear wheels.

● WING

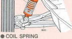
The wing attached on many racing cars is employed to gain stability at high speed running. With your radio controlled cars, the rear wing is used to press down the rear wheels for improving the traction on the road. In this way, the gripping power of the rear wheel becomes greater than that of the front wheels and the steering trait changes toward understeering. The faster the car goes, the more effective the wing becomes, that is, the greater the down thrust on the rear wheels. Depending upon the way you adjust the wing, the car can have an excellent cornering characteristic on a low speed curve, but still keep superb stability on the high speed straights. Such a car, also, will show a good adhesion to the road at high speed running. The effect of the wing is lessened when the wing is flattened. The more it is lifted, the greater the down-force. However, it increases the air drag, too, and the velocity of the car slowed. Therefore, the adjustment of the wing must be made carefully, and with the proper adjustment an ideal maneuverability will be attained.



Downward force on the aerofoil forces the rear tyres to grip better.

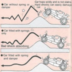
3. SUSPENSION

In order to run a radio controlled model smoothly and swiftly over differing road conditions, the suspension system that joins the wheels to the chassis, plays an important roll. Various types of suspension system are used for buggies and on road cars to obtain maximum traction from the tires on the running surface. Suspension systems such as double wishbone, and trailing arm type are used on R/C model cars just as on full sized vehicles. These are basically composed of upper and lower arms, coil springs, and damper units that absorb the energy stored in the spring upon compression. When adjusting suspension systems to track conditions, first adjust the coil spring stiffness, then the damper.



● COIL SPRING ADJUSTMENTS

Coil springs fitted to suspension units are there to assist the suspension in following the surface its running on. It is a mechanical device that stores and dissipates shock energy to keep the car running steadily on the track. A too stiff spring results in an uncontrolled suspension that will cause the car to hop around wildly. If its too soft, the car will bottom out on the ground at each bump on the track. Springs should be adjusted according to the overall weight that compresses them. The coil springs included in the kits are designed and matched to the car, and should provide standard performance. If the car is modified and trimmed for lighter weight, use a softer spring. Springs should be stiffened using spacers, after installing higher output motors, in order to compensate for the extra power. Using stiffer springs on rough terrain and softer springs on flat tracks is the normal rule.


● Car without spring or damper
Car hops wildly and is not stable. Hard shocks can easily damage car.
● Car fitted with springs only
Bad shock absorbing
● Car fitted with spring and damper

Damper absorbs shock energy.

● ADJUST DAMPER ACCORDING TO SPRING STIFFNESS

The dampers widely used in R/C cars are of the oil filled type. The higher the viscosity of the damper oil, the stiffer the damper, on the other hand, the lower the viscosity, the softer the damper. The Tamiya R/C spare parts, Damper Oil Set (5274), includes hard and soft type oil. The yellow is the soft and the red is the hard. Combining these two types of oil enable you to adjust your damper unit for various road conditions. When using hard springs use harder damper oil, and for soft springs use softer damper oil.

● MAKE SURE THAT ARM MOVEMENT IS SMOOTH

Even though you have perfectly adjusted your springs and shock absorbers, a faulty suspension arm movement is going to spoil it all. Always maintain and make sure that the suspension arms move smoothly.

★Tips for good setting

Put the car down on the floor with just the coil springs fitted and select springs that are slightly compressed with the weight of the car. Next, attach the oil dampers and press the car down and see if the car moves toward the at-rest position slowly. Bouncing back up is an indication of insufficient damping. Now drop the car on the floor from a height of about 30cm and check to see that the car lands without bouncing or bottoming out, and that the springs aren't completely compressed. If this is attained, your adjustments are just about finished. Do the final adjusting by actually running the car on the track to be used.

● SUMMARY OF CAR CHARACTERISTICS

Before you become familiar with controlling techniques, it is recommended to keep the car under steering. (Refer to "How your car takes corners"). Adjustment of toe-in and toe-out, tread and wheelbase all have some connections with steering characteristics. These adjustments interact closely. Test your car in various ways and find out the most proper steering characteristic for good control.

ENJOYMENT OF IMPROVING PERFORMANCE

As you attain proficiency in controlling cars, you will be tempted to improve your car. This chapter will introduce handy ways of increasing performance. The most important matter you have to keep in mind when you modify your car is to keep everything in balance. By putting a big motor on your car, you can make it run faster. Still it cannot be an improvement of performance if it has lost stability. Most kits on the market are produced by the manufacturer with all factors considered such as speed, maneuverability and durability. So try to enhance the collective performance of your car.

1. UTILIZING AVAILABLE PARTS FOR IMPROVEMENT

Some car kits have optional tune up parts available on the market, such as more powerful motors, differentials and ball bearings. As an example, changing the 380 type motor for the more powerful 540 type will greatly increase the speed of your model. Ball bearings are very effective in reducing the rotating friction of wheels and axles, allowing more motor power to the driving wheels. On racing cars it is good practice to replace the rubber like semi-pneumatic tires to sponge tires for better traction. Different sponge tires are available for your racing needs. For the front wheels, special diplo tires are available, which will improve both the straight running ability and cornering simultaneously.

2. ADOPTING PARTS MADE FOR OTHER KITS

You can also adapt repair and tune up parts for other vehicles to your own vehicle. For example, the Tamiya Ford C100 Racing Master Mk.4 kit (5833) includes the 540 type motor. but a replacement to the more powerful RS-540SD Black Motor can be made without any modifications at all. A speed controller without a diode in the circuit doesn't allow the use of the motor battery as a receiver battery also, thereby lightening overall weight. If you replace the speed controller to one with a diode, you can then use the 7.2V battery for both purposes safely. By adding the Tornado Racing Master Mk. 3 (5832) mechanism deck and differential unit to the Ford C100, it will have similar performance to the Tornado. Select tires according to the road surface, and tune up your vehicle with the many parts available. You will be amazed as how much of an increase in performance you can obtain with very little effort and expenditure of funds.

(CHANGING THE TIRES TO SPONGE TIRES)

3. UTILIZATION OF PARTS OF OTHER KINDS OF MODELS AND EVERYDAY LIFE COMPONENTS

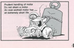
Many sorts of parts are available on the market, other than radio controlled electric car parts. For instance, a type of push rod connecting servo horns and control units in a model are sold which have threaded ends and easy to adjust length. Also, a velcro pad with one-sided adhesive may be used for binding the wiring and installing car bodies, etc. So these items of other crafts besides model building and components of daily necessities can be of good use for your radio controlled electric model cars.

4. LIGHTENING WEIGHT

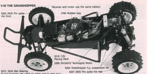
Lightening the weight of a model car is another effective way to enhance the performance. Cutting off part of chassis and gearbox case is often done. Also, the window shield is made of thin 0.2 mm transparent plastic plate or only 1 battery unit supplies energy to both the radio control receiver and the driver motor is employed. But radio controlled cars are subject to shocks from road surfaces while running, and to the impact of collisions. So the car must be very sturdily built.

5. SUPPLEMENTARY OF BATTERY POWER AND REMODELLING MOTOR

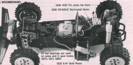
By increasing the number of batteries, improvement of performance can be certainly achieved. However, this must be done very carefully because the motor and the switch may be overstrained. Rewinding a motor armature with thicker wire makes a motor rotate faster, but it will draw much more current. Also, filling up the gap between the armature and the magnets amplifies the torque; this can be done by inserting 2 or 3 sheets of cellophane in the place. Nevertheless, the motor is such a precision made item that these renovations may decrease performances or deteriorate the durability of the motor. And chances are in many official racing events that the maximum voltage is placed under restriction; sometimes reworking the motor is prohibited at all.


Prudent handling of motor
Do not strain a motor.
An over-worked motor has an extremely short life.

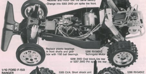
1/10 THE GRASSHOPPER


Receiver and motor use the same battery.
5303 2WD Pin spike tire front
5194 Rubber bag
5515 7.2V Racing Pack
5290 RX-540VZ Technigold Motor
5224 Grasshopper h.p. suspension kit
5257 2WD Pin spike tire rear
5073, 5242 Ball bearing
(9 ball bearings are used on axles and in gear box.)

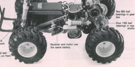
1/10 THE BOOMERANG


5236 4WD Pin spike tire front
5290 RX-540VZ Technigold Motor
24 ball bearings are used on axles and in gear boxes. (5073, 5241, 5284)
5525 8.4V Gold Power
5235 4WD Pin spike tire front

1/10 FALCON


Receiver and motor use the same battery.
Change into 5303 2WD pin spike tire front.
Replace plastic bearings in front shafts and gear box with 1150 ball bearings.
5290 RX-540VZ Technigold Motor
5256 2WD Oval block tire rear or 5257 2WD Pin spike tire rear

1/10 FORD F-150 RANGER BLACKFOOT


5305 CVA. Short shock unit
5290 RX-540VZ Technigold Motor
Two 850 ball bearings in gear box
Four 1150 ball bearings in rear shafts
5305 CVA. Short shock unit
Receiver and motor use the same battery.
Four 1150 ball bearings on front shafts

OFF ROAD DRIVING CARE

OVER RUNNING YOUR CAR CAN CAUSE MISHAPS AND PROBLEMS

Even though you own an off-road vehicle, you must select your driving areas with care to keep your vehicle in good condition. Inconsiderate driving will cause trouble and possible damage to your car.

1. UNSUITABLE DRIVING SURFACES

● DRY RIVER BED

A dry river bed where many large rocks are found is perhaps the worst place for driving an off roader. In 1/10 scale, even a stone with a 10cm dia is the same as a 10 meter dia boulder in real life. Driving against these objects is like intentionally destroying your vehicle.

Driving in a dry river bed can damage the car.

● GRASSLAND

Grasslands with tall grass and stems are bad for buggies because the grass can become entangled in the rear shafts and universal joints, which cause an unnecessary load on the motor which can cause overheating.

Note: grass can become entangled in rear shafts.

2. SURFACE THAT REQUIRE SPECIAL HANDLING

● ASPHALT AND LAWNS

Highspeed cornering on concrete, asphalt or smooth lawns will cause the vehicle to roll. Slow down a little when cornering on these surfaces.

Do cornering on pavement at lower speeds.

3. DIFFICULT SURFACES

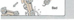
● GRAVEL AND DRY SAND

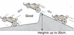
These surfaces offer considerable resistance to your vehicle. There is a burden on the motor and it will use much more current. The vehicle will not move as fast on this type of terrain, and on loose dry sand the tire can become buried and spin, without moving the car.

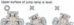
Tires dig into sand.

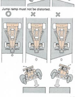
4. JUMPS

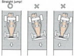
Dynamic jumping is a part of off road driving; however, you can damage your car if you do it recklessly. A jump must be done so that the rear wheels land first with the vehicle level. In order for it to be in a level/slightly nose high attitude, you must leave the ramp squarely and not enter it from an angle. If you do not do this, the car will tend to tumble while it is in the air and land off balance. Your jumping ramp can be up to 20cm in height for safe, smooth jumps.


Improper jump


Good ramp: good jumping style.


Upper surface of jump ramp is level.


Jump ramp must not be distorted.


Straight jump!

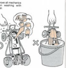
5. WATER AND PONDS

You may sometimes run into a puddle or two when running off-road. Radio control unit, motor, speed controller, and batteries are very sensitive to moisture. Avoid running into standing water and heavy rain. A splash of water from the car is enough to damage the mechanics.

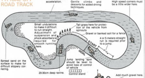
Avoid running into water.

6. MAINTAINING OFF ROAD CARS

Since off road cars and buggies are designed to run mostly on dirt, and often are run on these surfaces, dust is a major problem compared to on-road-going cars. Always completely clean your car after running it. Dust can be easily removed using brushes with stiff bristles. If the car was drove through loose ground or puddle, ending up with mud all over the car, wipe off mud from easy-to-reach areas using tissue papers or rag and let the rest of the dirt dry off. When completely dried, mud will come off easily by brushing and chipping off using screwdrivers. For nasty mud clogs remove wheel, suspension, etc. for a thorough clean up. Remove all mechanics such as servos, receiver, speed controller, and motor when washing with water to prevent water getting into the mechanics. After washing, completely wipe off moisture and thoroughly dry to prevent any rust, and reapply oil and grease in gear box, shafts, bearing, and all moving parts.


Remove all mechanics when washing with water.

TYPICAL OFF ROAD TRACK


A straight run for acceleration.
Gentle climbs and descents for added driving techniques.
High speed corners must be a little wider here.
Small undulations to make it difficult to run straight. Adjustment of suspension and shock absorbers is required for smooth running here.
Tall grass here for protection of the vehicle from spinouts
Gravel or banked soil for a fence
4 or 5 meters straight run is required prior to a jump.
START
GOAL
Ⓐ
Ⓑ
Spread sand on the surface to make for difficult slippery cornering.
Jump landing spot should be level to avoid loss of control of vehicle
Control stand
20-30cm deep ravine.
Add much gravel here.

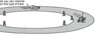
Ⓐ, Ⓑ Points
Put a lot of gravel on the inside of corners to prevent car from cutting corner.

■ The most difficult driving areas should be placed near the control stand.

High speed, full counter steering course

OVAL DIRT COURSE

An oval dirt course can be set up on school grounds and parks. Although it is simple you can improve your driving technique quickly on this type of track.



DRIVING IN RAIN

It is recommended to refrain from running your car in rain because the radio control mechanism is liable to be affected by water. However, races may be held in drizzle. It is necessary to have some basic knowledge of driving in the rain.

1. DRIVING TECHNIQUE IN RAIN

Any wet race track is very slippery, so cars may spin even when they accelerate at the start. Read the description of driving on slippery surfaces on page 9 and drive your car accordingly. Quick acceleration, quick deceleration and sudden steering are taboo. In cornering, keep the steering angle of the front wheels as little as possible so that the turning radius is large. When there are puddles on the racecourse, avoid them even if your car has to make a detour. If you attempt to drive through deep water, the radio control gear may get wet and your car will be slowed by the resistance of water. Furthermore, your car may skid out of control.

2. WATERPROOFING

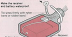
The radio control mechanism, particularly the receiver and servos, contains precision electric circuits carrying weak electric currents for control. If water enters the mechanism, it may cause a short circuit which often causes damage to an electric circuit and makes it impossible to control the car. If a wet electric circuit is kept electrified, its fine wiring begins to corrode gradually by chemical reaction and may be broken even by a slight shock some time later. Such a circuit may become unrepairable. Therefore, the radio control mechanism must be made waterproof. If the weather forecast says it will rain on the day of racing, it is necessary to make the radio control mechanism waterproof in advance.

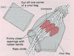
●Waterproofing of car body

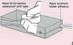
It is rare for the radio control mechanism to get wet directly by raindrops because it is contained in the car body. Pay attention to water splashed by the front and rear wheels and water entering the car body through the chassis. Openings in the chassis, such as holes bored to reduce weight, should be covered up with vinyl tape or similar. Another means for preventing spray from entering the car body is to fix screens of toughened polystyrene sheet or aluminium plate to the chassis parts just in front of, behind, and inside each wheel to deflect the spray.

●Waterproofing of radio control mechanism, etc.

The receiver in the radio control mechanism is most likely to be affected by water. To make it waterproof, wrap it in a vinyl bag, the mouth of which is firmly closed by means of a nylon band, as shown in the illustration. It is advisable to apply vinyl tape or similar to the joints of connectors and casing. It is difficult to put servos into vinyl bags because they have moving parts. However, at least their lead wire holes should be filled with synthetic rubber adhesive. The waterproofing of the connectors for the radio control mechanism and traction motor is also important. Put the connectors into a vinyl bag and close it by means of rubber bands. Previously, the switch for the receiver/servos often became faulty because of short circuits, etc., caused by water. Nowadays, it is almost free of such troubles. But, it is advisable to move it to a position which is less liable to become wet, and to apply synthetic rubber adhesive to its lead wire holes. Tamiya Oil Spray will help to waterproof the speed control switch, electric motor, etc. Also, the battery is liable to be affected by water and should also be put into a vinyl bag.


Make the receiver and battery waterproof.
Tie wires firmly with nylon band or rubber band.
Receiver
Rubber bag


Cut off one corner of a vinyl bag.
Connector
Firmly close openings with rubber bands.
Pass cords.
Vinyl Bag


Make Ni-Cd battery waterproof with tape.
Apply synthetic rubber adhesive.

NOTE: Vinyl bags, though cheap and readily available, are prone to tearing easily and will not offer permanent protecion such as the Tamiya rubber bags will.

3. MAINTENANCE AFTER RUNNING

On a rainy day, the car gets very wet and dirty, and it is almost impossible to prevent water from entering the car. If it is left as it is, the chassis, etc., may rust and the radio control mechanism may develop unexpected trouble. After using the car in rain, be sure to carry out maintenance as soon as possible.

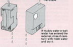
●Maintenance of car body and chassis

Wipe water off carefully with a soft cloth. The chassis, in particular, should be taken apart, the axles should be removed and thoroughly dried. Oil anew all moving parts because their oil has probably been washed away by water. Adhesive fixing of the servos, etc., may have been weakened by water. It is recommended to refix them with new adhesive. Tamiya Oil Spray gets under water and protects metal surfaces. Use it on moving parts.

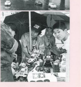
●Maintenance of radio control mechanism, etc.

Remove all the connectors and wipe off water from the whole mechanism. Then, remove it from the car and dry it in an airy place in the shade. If the receiver is wet inside, remove the casing, wipe off water, and dry in the shade. (The receiver must be handled with care.) If the receiver is wet inside with muddy water or salt water, carefully rinse it with clean water. After it has dried completely carry out a performance test. If it does not work, have it serviced by the manufacturer or his agent. As for the electric motor and speed control switch, it is recommended to apply Oil Spray or similar after carefully wiping off all water. Also dry the battery thoroughly.

★The RC mechanism contains precision electric circuits. Do not attempt to take it apart.


Dry in airy place in the shade.
If muddy water or salt water has entered the receiver, rinse it carefully with fresh water and dry it.

STOP
Do not run the car into puddles.
WATER



ELIMINATING RECEIVER BATTERIES

TAMIYA BATTERY ELIMINATOR AND BEC EQUIPPED RADIO UNIT

The battery eliminator equipped proportional unit referred to as BEC (Battery Eliminator Circuitry) was developed under cooperation with Tamiya and Japanese radio unit manufacturers in order to simplify the task of eliminating the receiver batteries.

★Stop the car immediately when the battery power drops off on cars utilizing the same power source for the receiver and motor to prevent the car from running out of control.

BEING LIGHTER MEANS GOING FASTER

Usually your radio controlled car will need 4 UM-3 dry batteries for the receiver. Eliminating the receiver batteries means that the receiver and servos operate utilizing the Ni-Cd running battery. This not only makes your car lighter, but is also more economical. The direct power from the Ni-Cd battery provides quick response for the steering and speed controller. The receiver and servos operate on 6 volts. Therefore, when a 7.2V Tamiya Ni-Cd running battery is used for the receiver, the voltage needs to be dropped to 6 volts. The battery eliminator does just that, smoothing out the current providing a stable 6 volt current. The BEC system proportional unit is a radio unit that is equipped with the eliminator. Normal radio units can be easily altered to eliminate receiver batteries by combining with Tamiya's battery eliminator.

THE EASY CHORE OF CONNECTING CONNECTORS TO ELIMINATE BATTERIES

Though not common, the modifications to eliminate receiver/servo batteries were well known amongst experienced R/C car enthusiasts by utilizing diode type eliminators. This modification carried some risks of wiring mishaps, which sometimes resulted in destroying the receiver unit. The BEC system proportional unit and Tamiya Battery Eliminator was developed to end the worries of misconnecting the wires and to simplify the battery eliminating task altogether. Using a 2 pin micro connector wired speed controller, the receiver batteries are easily eliminated without the hassle of any wiring chores what so ever. All you have to do is to pull out the unneeded receiver battery connector and replace it with the Eliminator connector.

TAMIYA BATTERY ELIMINATOR

5249 Sanwa type

5250 Futaba A type

5251 Futaba B type

5252 JR type

5261 Acoms type

5262 KO type

SPEED CONTROLLER SET

5253 Hornet Speed Controller Set
5254 Wild One Speed Controller Set

RECEIVER BATTERY ELIMINATING CONVERSIONS FOR YOUR TAMIYA R/C CARS

★6 different Tamiya battery eliminator units are available for use with the 6 most widely used radio systems. Select one that matches your radio systems.

Car name	R/C Unit	Required parts for conversion
Cars suitable for BEC (Kits identified with BEC mark on package)	BEC	No parts required for conversion
	Standard R/C units	R/C SP 5249-5252, 5261, 5262 Tamiya Battery Eliminators
The Frog The Hornet The Grasshopper Lancia Rally Subaru Brat	BEC	R/C SP 5253 Hornet Speed Controller
	Standard R/C units	R/C SP 5249-5252, 5261, 5262 Tamiya Battery Eliminator R/C 5253 Hornet Speed Controller
Wild One Fast Attack Vehicle	BEC	R/C SP 5254 Wild One Speed Controller
	Standard R/C units	R/C SP 5249-5252, 5261, 5262 Tamiya Battery Eliminator R/C SP 5254 Wild One Speed Controller
Porsche 956 Toyota TOM'S 84C	BEC [1]	R/C SP 5255 2 Pin Micro Connector Set
	Standard R/C units [2]	R/C SP 5249-5252, 5261, 5262 Tamiya Battery Eliminator R/C SP 5255 2 Pin Micro Connector Set

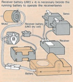
[1] Remove the kit supplied diode type receiver switch and substitute the receiver switch supplied with the BEC equipped radio unit.

[2] Remove the kit supplied diode type receiver switch and replace it with a Tamiya Battery Eliminator. Connect up the 2 Pin Micro Connector to the receiver power source cable located on the speed controller.

The Porsche 956 and Toyota TOM'S 84C are designed to obtain receiver power from running battery but can be altered to accept BEC system radio and Tamiya Battery Eliminators by combining it with the 2 Pin Micro Connector set (5255).

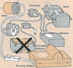
<STANDARD R/C UNIT>

Receiver battery (UM3 x 4) is necessary beside the running battery to operate the receiver/servo.

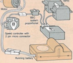


<R/C UNIT WITH TAMIYA BATTERY ELIMINATOR>

Any R/C car that will accept speed controllers prewired with the 2 pin micro connector can be easily altered to eliminate receiver batteries using BEC system radio or Tamiya Battery Eliminator.



<BEC SYSTEM RADIO UNIT>



POWER SOURCE

Tamiya Ni-Cd batteries are developed in conjunction with the Sanyo Electric company who is a leading manufacturer of Ni-Cd batteries. Therefore, Tamiya's Ni-Cd batteries utilize Sanyo's original tab-less system for obtaining the utmost current flow, resulting in swifter, powerful acceleration and higher performance. If the battery is handled correctly and cared for, it can be recharged more than 500 times, and that's very economical, even though the purchasing cost might be a little expensive compared to dry cell batteries. For running power source of R/C models, Tamiya provides a wide range of Ni-Cd batteries to suit all purposes. 6V-1200mAh batteries, large capacity 6V-4000mAh batteries used for giant R/C models, hump type 7.2V-1200mAh batteries that has the same length and width as the 6V battery, flat type 7.2V-1200mAh Racing Packs for competition use, and for those seeking more power, 8.4V-1200mAh Gold Power batteries are available.

TAMIYA Ni-Cd BATTERY 6V-1200mAh 6V-4000mAh 7.2V-1200mAh

5502
5512
5508

TAMIYA Ni-Cd BATTERY

• Nominal capacity (5 hours)—1200mAh/4000mAh • Nominal voltage-6V/7.2V • Final discharge voltage—5V/6V • Standard charging current—120mA/400mA • Maximum discharge current—4.8A/16A • Standard charging time—14—16 hours • Temperature range—discharge: −20°C to +60°C, Charge: 0°C to +45°C, Long preservation: −30°C to +45°C • Dimensions & weight—117 x 50 x 25 mm about 305 g (6V 1200mAh), 130 x 104 x 37 mm about 900 g (6V 4000mAh), 117 x 50 x 40 mm about 370 g (7.2V 1200mAh)

TAMIYA Ni-Cd BATTERY 7.2V-1200mAh RACING PACK

5515

TAMIYA Ni-Cd
7.2V-1200mAh
RACING PACK

• Nominal capacity (5 hours)—1200mAh • Nominal voltage—7.2V • Final discharge voltage—6.0V • Standard charging current—120mA • Standard charging time—14—16 hours • Maximum discharge current—4.8A • Temperature range—discharge: −20°C to +60°C, Charge: 0°C to +45°C, Long preservation: −30°C to +35°C • Dimensions—130 x 46 x 24 mm • Weight—about 310 g

TAMIYA Ni-Cd BATTERY 8.4V-1200mAh GOLD POWER

5525

TAMIYA 8.4V Ni-Cd BATTERY GOLD POWER

• Nominal capacity (5 hours)—1200mAh • Nominal voltage—8.4V • Final discharge voltage—7.0V • Standard charging current—360mA • Standard charging time—4-6 hours • Maximum discharge current—4.8A • Temperature range—discharge: −20°C to +60°C, Charge: 0°C to +45°C, Long preservation: −30°C to +35°C • Dimensions—160 x 40 x 25 mm • Weight—about 370g

TAMIYA Ni-Cd BATTERY QUICK CHARGER

5506
5514
5510

6V-1200mAh
6V-4000mAh
7.2V-1200mAh

EXCLUSIVE QUICK CHARGER FOR USE WITH TAMIYA NI-CD BATTERIES

This is an exclusive fully automatic charger designed for safety and reliance, for quick recharging of Tamiya Ni-Cd batteries. The charger is powered from a cigarette lighter socket in a car which makes it excellent for field use. The standard charging time is only fifteen minutes; short enough to recharge the battery during an interval of the races. When the charging is completed, the charger automatically switches off and the pilot lamp goes out. A different circuit is incorporated and whilst charging, the charger is constantly checking the state of the battery. Inadequate or overcharging is impossible and an already saturated battery cannot be damaged by continued charging. Also, the charger is designed for safety against over-heating of both charger and battery. If any extraordinary heat is generated from either unit, the switch turns off automatically. Safety is very important with a quick charger, because it supplies a lot of current at a time.

The size is about 11.1cm x 7cm x 5.5cm, weighing only 220 grams; very compact and easy to carry. The length of the input cord is 80cm and the outlet cord 35cm—long enough to use. The pilot lamp will light while charging and go out when the charging is complete as an extra safe guard. All in all the Tamiya quick charger features a safe and prudent design for reliable and handy operation, adding to the enjoyment of radio controlled cars.

• Battery to charge—Tamiya Ni-Cd battery 6V 1200mAh/7.2V 1200mAh • Power source for charging—car cigarette lighter (12V negative earth) • Charging time—about 15 minutes • Temperature range for operation—0°C to 40°C • Charging capacity—70% (nominal capacity ratio is variable according to ambient conditions) • Resistance cord is provided with over-heating protection • Dimensions 111 x 70 x 55 mm • Weight—about 220 g • Length of input cord—800mm • Length of output cord—350mm

• Charger for the Tamiya Ni-Cd battery 6V-4000mAh • Power source for charging—car cigarette lighter (12V negative 4 round) • Charging time—approx. 60 minutes • Temperature range for operation—0°C to 40°C • Charging capacity—100% • Resistance cord provided with over-heating protection • Dimensions 111 x 70 x 55mm • Weight—approx. 220g • Length of input cord—1550mm • Length of output cord—350mm

TAMIYA Ni-Cd BATTERY MINI PACK IS CONVENIENT, ECONOMICAL AND SUITABLE FOR GOOD PERFORMANCE

Tamiya Ni-Cd 6V Battery Mini Pack can be used conveniently as a power source for the receiver. Its size is half that of four UM(3) batteries and its weight is 2/3rds. It is effective in making performance better by lightening the weight of the R/C car. Using charging wire included with the 6V Mini Pack, it can be charged easily and quickly from a Tamiya Ni-Cd 7.2V battery. In addition to a power source for R/C cars, it can be used with other R/C models.

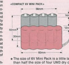
TAMIYA Ni-Cd BATTERY 6V-150mAh MINI PACK

5516

TAMIYA Ni-Cd
6V-150mAh
BATTERY

• Nominal capacity (5 hours)—150mAh • Nominal voltage—6.0V • Final discharge voltage—5.0V • Standard charging current—15mA • Standard charging time—14–16 hours • Maximum discharge current—60mA • Temperature range—discharge: −20°C to +45°C, Charge: 0°C to +45°C, Long preservation: −30°C to +35°C • Dimensions—60 x 30 x 12 mm • Weight—about 50g

<COMPACT 6V MINI PACK>



★ The size of 6V Mini Pack is a little larger than half the size of four UM3 dry cells. It doesn't need a large space.

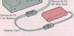
<LIGHT 6V MINI PACK>

6V Mini Pack about 56g
Four UM3 dry cells about 77g

Weight of 6V Mini Pack is about 2/3 of four UM3 dry cells. It is very useful for reducing weight to make performance better.

Charge of 6V Mini Pack

The capacity of 6V Mini Pack is 150mAh and is about 1/3 of a UM3 dry cell; however, it can be safely recharged over 500 times. There are 2 kinds of charging methods, normal trickle charge and quick charge with the adapter cord.



Charging

It is possible to recharge 6V Mini Pack from Tamiya Ni-Cd 7.2V battery by utilizing the adapter cord supplied in the set. It is useful for those who use a 7.2V Ni-Cd regular battery and racing pack. Charging for 15 to 30 minutes allows for 20 to 30 minutes running as a receiver battery of a 2 channel R/C unit.

★ Use for 2 channel radio control unit
★ A full charge Ni-Cd 7.2V pack will charge a Mini Pack about 5 times (15 minute charge).

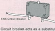
Charging time	15 min.	30 min.	60 min.
Operating time	20 min.	30 min.	40 min.

Chargers

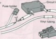
A suitable charger must be purchased at an electric appliance store or hobby shop. Charging times vary according to the type of charger used; however, this battery can be fully charged in 14 – 16 hours using the normal "trickle" charger.

How to use circuit breaker (5105)

If you install a 7.2V battery or a larger motor in R/C cars using a 6V battery, replace fuse to a circuit breaker (5105)



Circuit breaker acts as a substitute for the fuse. Remove fuse holders and connect circuit breaker as shown. Fix circuit breaker on receiver with double sided tape.



If the circuit is overloaded, the button on the side of the cut-out protrudes and the current is stopped. After determining the cause, the button should be pressed in and the vehicle restarted.

HOW TO USE TAMIYA Ni-Cd 8.4V-1200mAh GOLD POWER BATTERY

THE GOLD POWER IS BEST SUITED TO 4WD CARS

4WD radio control cars are ideal for 8.4V batteries since the enormous power is distributed through all 4 wheels enabling easier control of the car. Tamiya's Bigwig was designed to use the 8.4V battery, but if you are going to use it on our other 4WD cars, such as the Hotshot, Supershot, and Boomerang, use the following parts to compensate for the extra power. Remember that more power means more wear and maintenance.

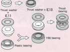
TECHNIGOLD MOTOR FOR 8.4V POWER

In order to utilize the power of the 8.4V battery, a new motor was developed using the combined knowledge of the Mabuchi Electric Motor Company and Tamiya's radio control car experience. The RX-540VZ Technigold motor was designed to get the utmost performance from the Gold Power battery, and provide the reliability desired by the serious enthusiast. Use a smaller pinion gear (13T — 15T) and always keep the motor maintained and tuned for the best performance at the track.

Usable voltage	7.2V — 8.4V
Torque at best efficiency	430g·cm (7.2V)
R.P.M. at best efficiency	19,000rpm (7.2V)
Current drain at best efficiency	14A (7.2V)

UP GRADE USING BALL BEARINGS

Plastic and metal bearings wear faster than ball bearings. Worn out bearings hinder gear rotation resulting in damage to the motor and electronics. The Supershot is fitted with all the bearings it can take, but the Hotshot and Boomerang must be up graded using the Hotshot Ball Bearing Set (R/C Spare Parts No. 5241) and the 850 Ball Bearings Set (R/C Spare Parts No. 5242).



● USING BALL THRUST BEARINGS

Replace thrust washers and parts E11 with ball thrust bearings on the Hotshot, Supershot and the Bigwig. They reduce wear and transmit power efficiently.

● THE 8.4V BATTERY ADAPTER

All the models have a 7.2V connector on the speed controller. Therefore an 8.4V Battery Adapter is required when using it.

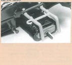
● HOTSHOT 8.4V BATTERY HOLDER

This 8.4V Battery Holder can be used for the Hotshot and the Supershot. The length is just right and screws easily into place.

Required parts	Ball bearings	Battery holder
Supershot		R/C Spare Parts 5296 8.4V Battery Holder
Hotshot	R/C Spare Parts 5241	R/C Spare Parts 5296 8.4V Battery Holder
Boomerang	R/C Spare Parts 5241, 5284, 5073. Requires 24 ball bearings	Alter position of battery holder A4 when using the 8.4V battery.

Each car listed requires the RX-540VZ Technigold motor and the 8.4V Battery Adapter.

Alter position of battery holder A4 as shown below to install 8.4V battery.



CAUTIONS

Radio controlled cars have the potential to exceed speeds of more than 40km/h. The high power Ni-Cd batteries, precision radio units and high performance motors combined together make this performance possible, and none of these factors should be abused if your car is to perform up to its limits. Misuse of your equipment will result in damage to the car, as well as leading to unnecessary accidents. Always pay close attention in your handling of R/C models.

●RUNNING THE CAR

1. FOLLOW CORRECT R/C OPERATING PROCEDURES

Follow the instructions outlined below when operating your R/C vehicle. They are important to prevent trouble and accidents.

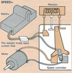
Before running	Switch on transmitter → Switch on receiver → Connect running battery.
After running	Disconnect running battery → Switch off receiver → Switch off transmitter.

2. NEVER DRIVE NEAR TRAFFIC OR CROWDS

You will be offending the traffic law if you run an R/C vehicle on the streets. Some R/C models exceed speeds of more than 40km/h. Imagine a model colliding with a human at that speed. Serious injury is likely to occur.

3. RUNNING IN LOW SPEED FOR LONG PERIODS BURNS OUT RESISTOR

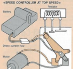
≪SPEED CONTROLLER AT LOW AND MIDDLE SPEED≫



R/C model cars are designed for racing purpose and not for low and middle speed running. Low and middle speeds are mainly used at tight corners as braking and for better acceleration. The current flow from the Ni-Cd battery is bled off in the form of heat at the resistor when at the low and middle speeds. Long running at these speeds will overheat the resistors and sometimes result in smoke from the resistor or melting the resistor plate.

★Touching the resistor during running or after running the car may get you burned.
★When the speed controller is in top speed, the resistor is not impeding any current flow, therefore no heat build up occurs.

≪SPEED CONTROLLER AT TOP SPEED≫



4. NEVER DRIVE INDOORS AND IN CONFINED AREAS

Running for long periods at the lower two speeds on the controller will cause the resistors to overheat. Also the chance for collisions are much greater, so always drive your R/C vehicle in a wide area.

Never attempt to free tangled cars by pouring on power.

5. NEVER IMPOSE TOO MUCH OF A LOAD ON THE MOTOR

Getting the wheels stuck in a ditch, stopping the wheels from rotating on purpose, pulling or carrying heavy objects, unnecessary hill climbs, etc. will seriously damage or burn out the motor. Never impose too much of a load on the motor. Once a motor is burned out, the running battery power will drop off to a shorter running time with a slower top end speed, which means you need to replace the motor.

★Motor may also burn out if adjustments at gears and joints are improper.

Avoid imposing too much of a load on motor.

6. YOU CAN'T CONTROL CAR WHEN BATTERY POWER DROPS OFF

A radio controlled car will run out of control when either the receiver or transmitter battery voltage drops off. The receiver does not have an indicator to indicate the remaining power, therefore extra attention is required. A car that is running using the BEC system radio unit or the battery eliminator obtains receiver battery power from the running battery, therefore stop the car immediately when the car starts to slow down to prevent the car from running off uncontrollably.

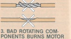
ASSEMBLY AND WIRING

1. BAD SPEED CONTROLLER ADJUSTMENT RESULTS IN RESISTOR HEAT BUILD UP

Make sure to check stop, low, middle and top speed positions of the speed controller with the radio unit. A speed controller arm that does not reach the top speed contact results in resistor heat build up.

2. TAKE MAXIMUM CARE IN WIRING, SECURING AND INSULATING CABLES

Make sure to properly insulate cables with heat shrink tubing supplied or vinyl tapes (never use cellophane tape). An improperly insulated cable will result in a short circuit.



3. BAD ROTATING COMPONENTS BURNS MOTOR

Stiff rotation of gears, shafts, joints and wheels results in motors burning out. After assembling gear box, check whether joint shafts rotate smoothly by rotating them using one 1.5V dry cell.

4. EXCESS VOLTAGE FLOW DAMAGES MOTOR AND SPEED CONTROLLER

Abide by using the prescribed and recommended voltage. Using excessive voltage Ni-Cd batteries damages or shortens the life of your motor, speed controller and other components.

REPLACE WORN SPEED CONTROLLER

Speed controllers work under heavy current flow, and worn contacts can be seen after many hours of running. Worn contacts add resistance. Check speed controllers periodically for wear, debris and dust on the contacts and replace the speed controller if necessary.

HOW TO TREAT YOUR Ni-Cd BATTERIES

1. DISCONNECT BATTERY CONNECTOR AND REMOVE, WHEN NOT USING THE CAR

Leaving your R/C car with the battery connected when not in use, may cause the speed controller to operate from other sources of radio waves which could result in resistor heat build up leading on to damage.

2. NEVER DISMANTLE OR SHORT CIRCUIT Ni-Cd BATTERIES

Tamiya's high performance Ni-Cd batteries put out as much as 300 watts. Abuse, dismantling and tampering with cables may evoke overheating or melting of the cables or battery case, and the battery itself is likely to be destroyed.

3. USE THE CORRECT CHARGER FOR CHARGING YOUR BATTERY

It is important to have the correct charger to enable you to obtain the very best performance possible from your battery. Over charging the battery not only damages the battery but may result in excess heat build up and fire. When either the battery or the charger becomes overheated during charging, stop the procedure and take it to the shop of purchase for inspection.

4. ABIDE BY THE CHARGING INSTRUCTION OF YOUR CHARGER

A specific length of cord (produced with a designated resistance value) is used on the input side of the quick charger for the Ni-Cd battery. This cable should not be cut, otherwise the resistance value will vary and the cable will heat up and melt. Also, do not attach any connector clip anywhere on the cable.

5. REVERSE CONNECTION DESTROYS CHARGER

Most damage done to a charger can be attributed to reverse polarity connections. Enormous current flows through the circuit between the charger and the battery at the moment it is connected in reverse. An overnight type charger is especially designed to provide trickle current flow for many hours, therefore the moment a heavy current is fed into the circuit from a wrong connection, it will burn out the circuit. The Tamiya system uses an exclusive socket fitted to each size of battery. The charger is fitted with an equivalent exclusive plug so that only the correct charger may be used on that battery.
When the quick charger is used for the Tamiya Ni-Cd battery, you are required to watch not only the direction of the connectors, but also polarity of the 12 volts power source (negative earth). Mistakes will cause the battery to burn out and become useless.

★An overnight type charger shows a difference in voltage from 3.5 to 4.5 volts when measured between the terminals without a battery connected. This indicates the charger works correctly. In the case of quick charger, it does not read any voltage; this is a normal condition, if the pilot lamp is on.

6. NEVER RECHARGE BATTERY WHEN THE BATTERY IS WARM

In most cases the Ni-Cd battery will become heated during use. Cool off the battery before commencing recharging to avoid damage.

7. WHEN USING QUICK CHARGER FROM THE CIGARETTE LIGHTER IN YOUR CAR, PLACE BOTH THE BATTERY AND THE CHARGER ON THE FLOOR

Not on dashboards or seats where they are unstable.

8. DISCONNECT BATTERY CONNECTOR WHEN YOU'RE NOT USING THE CAR AND SWITCH OFF RECEIVER/TRANSMITTER

After finishing running your R/C car, make sure to disconnect battery connector and remove the battery from the car. Switch off receiver. A connected running battery and turned on receiver combined together may catch other sources of radio waves causing a run away or overheated resistors and burning cables.

9. WATER IN THE BATTERY

Water which penetrates into a battery may cause a short circuit or corrode the internal wiring when the electricity flows through the wet wiring. Therefore, if the battery becomes wet, stop running the car and dry the battery completely.

10. PULL OUT CHARGER PLUG AFTER USE

11. NEVER INCINERATE USED BATTERIES

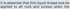
Lack of attention to your R/C equipment may lead to unnecessary trouble. Take the utmost cautions in handling your R/C cars for long lasting enjoyment.

MAINTENANCE MATERIALS

TAMIYA SPRAY OIL

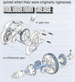
Tamiya Spray Oil is an oil which utilizes a molecular chemical formulated compound, in the U.S.A. which has proved effective as a long lasting lubricant. As it has strong permeability, spraying on bearings, within gear boxes, moving shafts and suspension parts, providing a smoother and less friction operation of all moving parts. It will also displace moisture and ensure longer rust free operation than normal penetrating lubricants. After your cars have been running in the rain or through puddles, spray Tamiya Spray Oil onto the chassis or other metal surfaces. This will penetrate between the water and the metal surface to form a layer which helps to dry up the surface and also protects the metal from rusting.

LIQUID THREAD LOCK



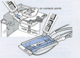
It is essential that this liquid thread lock be applied to all nuts and screws when the model is assembled. This liquid is not a glue, but a securing agent. It will prevent screws from working loose, which will happen if it is not used. It is very effective and easy to use. At any time, screws can be loosened or removed for maintenance or repairs by using about twice the force required when they were originally tightened.

MOLYBDENUM GREASE



This is the most effective grease available to the R/C enthusiast for maintaining a vehicle in the proper running condition. It reduces friction, stays where you put it and is safe with all plastics. The minute particles of Molybdenum disulfied, in the grease, coat the parts with a film of extremely effective lubricant that will remain on the parts much longer than other oils. It maintains its viscosity over a very wide temperature range and will not fly off of moving parts like other lubricants. This Molybdenum grease will substantially prolong the life of your R/C car and it will greatly lengthen the time required between maintenance periods. The long nozzle on the tube makes it easy to get at the hard to reach places, and you will use less of this grease because it will stay where you put it.

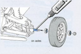
SWITCH LUBRICANT



Your speed controller, in order for it to do the job properly, must work smoothly and respond to the slightest movement of the transmitter control. This switch lubricant will provide you with a speed controller that responds correctly each and every time. The lubricant also helps to suppress the arcing that is always present, in any high current flowing switch, and will prolong its life far longer than expected. This switch lubricant is also safe with plastics and the 10g tube is easy to use. Remember, your speed controller is next in importance to your steering, so use the lubricant periodically to ensure proper performance of your R/C car and to prolong its life.

CERAMIC GREASE

This grease is formulated using Boron Nitride particles, and is ideal for use on electric powered R/C vehicles. It should be applied to all bearings, shafts and gears. Worries about plastic corrosion is done away with through use of this grease. It maintains its viscosity throughout a wide temperature range. Ceramic grease will substantially prolong the life of your R/C vehicle and keep it performing at its best. Each tube contains 10g of lubricant, and the long nozzle makes it easy to apply the proper amount in those hard-to-reach areas.



PAINTING OF R/C CAR BODIES

A large part of the enjoyment of R/C cars is in the construction and running of the vehicle; however, the final finishing and painting can also provide great pleasure. The clear bodies of polycarbonate (LEXAN) offer the greatest challenge in painting to most modelers because they are not familiar with the methods of painting these types of bodies. There are two types of bodies available for R/C vehicles. The highly detailed and true to life looking bodies are made from styrol resin and are injected molded. They are heavier and can be damaged during hard accidents on the track. Polycarbonate is thin, light and almost damage proof, but not as detailed as the styrol, and is vacuum formed.

SOME HINTS ON PAINTING.

If you have a choice, paint on a clear day with little humidity. Painting on a damp day will leave the finish cloudy or milky due to "Blushing".

★Ventilate the painting area by opening a window

★Never paint near an open flame

★Spray paint outdoors in a windless area.

PAINTING OF INJECTED MOLDED BODIES

These bodies are made from shock resistant styrol and are from the same basic material of plastic models. Suitable paints are the Tamiya acrylics, Paint markers or other paints for plastics.

(1) Preparation

You must remove all dust and oil from the surface of the plastic by washing it well with a kitchen detergent, then rinsing it off with clear water and drying thoroughly. All of the parts that are to be painted in the same color are gathered together in one place. Joint and seam lines are cleaned up with a modeling knife and sanded down with very fine finishing paper. Hold the small parts for painting with a spring clip. If spray painting, set the parts on a box or stand to make it easy.

Clean up joints and seams with the edge of a knife blade. Finish them with fine abrasive paper.

Hold small parts with a clip.

(2) When painting many colors

When you are adding stripes or doing different contrasting colors, masking of the areas is vital. Use only a high grade of paper masking tape, not the masking tape used for full sized vehicle painting. Frisket paper and paper tape is available from good hobby shops and art stores. Remember the golden rule of painting outside surfaces: Always paint the light colors first, then go on to the darker colors. Mask small areas at a time. When doing a large area, cover it with newspaper, masking the edges of the paper with tape. When doing curves, place the tape into position, then draw in the curve with pencil, cut and remove the unwanted areas of tape with a modeling knife. Press the edges of the masking tape down firmly with your finger or toothpick.

Cut away unwanted areas of the tape with a sharp knife, to form patterns and curves.

(3) Painting

For finishing large areas, spraying is easier and the results are better. Remember to use the light colors first, then on to the darker shades. Remove any masking just prior to the paint becoming completely dry. Add any detail painting and the driver figure. Polishing with a compound will add a high gloss finish.

Hold spray can about 30cm from the model. Spray lightly always moving in the same direction.

○Spray painting hints.

★Spray paint about 30cm from the model.

★Spray a light coat for good paint adhesion. It will dry faster and you can add another coat in a few minutes.

★When the distance between can and model is too close, or you try to do a thick coat to finish quickly, you will get runs, and the paint will not adhere to the plastic properly.

○Brush painting hints

★Select the brush according to the job. Use a wide flat brush for large areas, and a fine, pointed brush for detail work.

★Paint only in one direction. Never back and forth like a house painter.

★Don't be concerned about blotches or mars at this time. Leave them and overpaint the area after it is completely dry.

○Cautions when overspraying

Accept the fact that you must not overspray acrylics and enamels with lacquers. It is perfectly acceptable and its done by the professionals to use different paints to achieve different effects. When spraying or brushing lacquers over enamels and acrylics the solvents in the lacquer will melt and distort other paints. Painting over lacquers is no problem. Use light coats for good adhesion and proper coverage. Do not try and complete the job with one coat of paint. Even when you are using the same paints, it is possible to apply a thick coat over the first coat, then end up melting the undercoat. Overspray quickly and lightly, using the same type of paint.

○Some practical advice

Bright colors, such as red, yellow and white, do not look good if painted over a dark color such as blue or black. Paint the surface first in flat white, then the finished red, yellow etc. will be bright.

○Painting polycarbonate bodies (LEXAN)

Lightness and toughness are features of polycarbonate bodies. Special paints are required for finishing these bodies. Normal plastic paints and lacquers will peel or chip off even with the slightest shock to the body so it is necessary to utilize polycarbonate paints especially formulated for this purpose.

(1) Preparation

Cut off the extra portions of the body using a sharp knife, by scribing in one stroke, on the parting line. Bend the extra away from the scribed line and it will snap or tear off perfectly. Use only a very sharp knife for scribing. A dull knife causes more injuries than you can imagine. After trimming the body to the required shape, sand off the edges smooth and all of the inside surfaces (except the window areas) with 400 grit finishing paper. This will provide a good base for the paint. When sanded, wash the entire body with detergent, rinse and let dry.

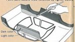
Roughen up the inside.
Wash body in detergent.

(2) Masking.

As in painting styrol bodies, masking is necessary when using more than one color. As painting will be done on the inside surfaces, it is done in reverse. Paint all the details first (Window frames, driver figure, engine, etc.). Paint the darker colors first, followed by the lighter ones. If spray painting also, you must mask off the entire outside surface of the body to prevent any overspray from marring the surface.

- **Paint small details first. (Window, panel lines, etc.)**

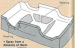
- **Paint dark colors first, followed by lighter colors**



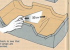
(3) Painting

As paint is applied from the inside, but viewed from the outside, the first coat (details) must appear as the outer most color when looking at the finished model. You must consider the order of your painting to achieve this effect, and as it is applied just the opposite from painting styrol bodies, you have to be thinking about it all the time.

- **Mask all windows and the outside of body completely**



- **Spray from a distance of 30cm**



Check to see that all areas are painted.

Hold the spray can about 30cm away from the body and spray the same as when doing styrol bodies. Check from the outside to make sure that you have covered all areas required. If the painted surface is uneven, let it dry and correct it later with an additional coat. When several coats are to be applied, let each dry thoroughly before applying another coat.

◎Hints

When the polycarbonate paint has dried it has a very strong film surface and the masking tape will tend to pull away the painted parts on the model. The masking tape should be removed prior to the paint drying completely. If the paint starts to peel away from the body while removing the masking tape, take a sharp knife and run the tip along the tape edge to free it from the painted surface, and it will then come off cleanly without removing the paint from the surface.

●Hints for finishing

Until the latter half of the 1960s, the racing cars at the International Races were painted in National Racing Colors which were designated for each country. However, lately they are painted in colors representing the image of sponsoring companies or the design of the merchandise package. Among the well known are the Martini stripes in red, blue and navy blue; a design from a cigarette pack in the black and yellow of the JPS Lotus; red and white of the Marlboro McLaren. Think out your own design, assuming you were a sponsoring firm.

The following is a list of some National Colors:

Japan	2 tones Red and White
UK	Green
USA	2 tones Blue and White
Italy	Red
France	Blue
Germany	Silver
Austria	Stripes of Blue and Silver
Belgium	Yellow

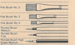
R/C BODY MAKE UP FOR PREPARATION PRIOR TO PAINTING

The decoration and finishing of R/C car bodies is not only self satisfying, but an essential part of the construction of radio control models. A beautifully finished car seems to run faster than the others and if it is an original or remodeled vehicle it will stand out conspicuously. Tamiya has made available almost all of the finishing material needed to produce a highly realistic model. They are of the highest quality, easy to use, and available from your local hobby supply house. Modeling brushes for painting; putties for repair; epoxies for remodeling; compounds for preparation of the plastics and applying the final gloss. These, and other Tamiya materials will assist you in producing a lifelike masterpiece for your enjoyment.

●For brush painting

TAMIYA MODELING BRUSHES

Tamiya produces 7 quality modeling paint brushes. They fit the hand easily and are easy to control when painting. 3 flat brushes for large painting areas. Number 5 has a width of 15mm, Number 3 a width of 8mm and Number 0 a width of 4mm. Four pointed detail brushes are available. Two from high grade horse hair and two extremely fine brushes from high grade weasel hair. These brushes will satisfy the most discriminating modelers.



●For preparation prior to painting

TAMIYA FINISHING ABRASIVES

This is a new clog resistant, wet or dry finishing paper. These types of abrasive papers are necessary for preparation of polycarbonate bodies prior to painting and also for sanding down to final shape any molded surfaces that have been modified with putty. They are also useful for keeping the speed controller clean and polished, for better control. A medium grade set is available for wood finishing, and a fine grade and a ultra fine grade sets for plastic and metal.

Medium set #180, #320 two sheets each and one sheet of #240

Fine set #400, #1000 two sheets each and one sheet of #600

Ultra Fine set #2000, #1500 two sheets each and one sheet of #1200

●Making small parts

TAMIYA EPOXY PUTTY

This is a two part putty that can be formed just like clay. Knead the two equal length putty parts together with your fingers. It will begin to harden in about an hour and will be completely cured in 12 hours. It can be carved with a modelling knife and sanded to final shape with finishing abrasives. It is useful for remodeling and repairs of plastic models.

●For filling holes and hiding seams

TAMIYA PUTTY

This is a soft, paste type of putty useful for filling holes and seam lines. It has low shrinkage and excellent adhesion on styrol type plastics. Quick drying!

●For original body construction

PLA-PLATE (WHITE) AND (TRANSPARENT)

These are sheets of styrol resin in the B4 size format. All plastic model cements and paints can be used. This plastic sheeting is excellent for modifications, repairs and original body construction. Two set sizes are available.

Pla-plate (White) 1.2mm, 0.5mm, 0.3mm 5 sheets each

Pla-plate (Transparent) 1.7mm, 0.5mm, 0.2mm 5 sheets each

●Modifications and repairs in conjunction with Pla-plate

PLA-PAPER 0.14mm & 0.27mm

This is a chemically coated plastic paper that has the strength of polystyrene plastic and the flexibility of paper. It can be cut easily with scissors into any desired shape and bonds well with plastic cements. It is easy to write upon, decorate with pencils, pens or paints, and has many varied uses to suit your modeling pleasure.

PLASTIC BEAMS, ROUND AND SQUARE

These are beams of styrol resin in square and round cross section. Compatible with the Pla-plate plastic sheets, these beams are easy to work and use in conjunction with repairs and modifications of bodies and framework. The material is easy to form, cut and bend for complex curves and will retain its shape after forming.

Plastic Beam Square
- 2mm, 3mm, 5mm (Length 40cm)

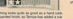
Plastic Beam Round
- 2mm, 3mm, 5mm (Length 40cm)

CLEAR PLASTIC PIPE 3mm, 5mm & 8mm

These are crystal clear polystyrene plastic pipe that can be reformed, stretched, bent or shaped with light heating, providing tremendous versatility in your modeling and hand crafting endeavors. It can be bonded with plastic cements, painted with any of the plastic paints, and cuts easily using a modeling knife. Each pipe is 40cm in length.

●For a hand rubbed finish!

TAMIYA RUBBING/POLISHING COMPOUND



Nothing looks quite as good as a hand rubbed painted finish, so Tamiya has added a rubbing and polishing compound to the growing line of finishing products. Painting over a rough surface will leave the finish rough, so preparation prior to painting is very important. With this rubbing compound you can prepare the surface for painting quickly and easily. The compound contains minute particles of abrasives suspended in a cream. It is good for removing parting lines on the plastic, finishing up puttied areas or correcting and eliminating glue joints. Fine scratches and blemishes on clear plastic parts, such as windshields and aircraft canopies, can be completely removed. Use it for polishing out the cloudy surfaces of lacquer paints and for adding a deep gloss to acrylics. ★NOTE: Not recommended for use on Tamiya Paint Marker finishes.

TAMIYA CRAFT TOOLS

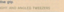
SIDE CUTTER FOR PLASTIC

This is a precision side cutter for removing parts from a plastic sprue without damaging the parts. Developed exclusively for plastic modeling, the impact resistant chrome vanadic alloy material was chosen for long life. High quality vinyl covering assures good grip.

LONG NOSE w/CUTTER

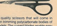
These quality long nose radio type pliers, with cutter, will come in handy during radio control kit construction. They are of high strength steel with a quality finish for long life. The cutter is capable of cutting 2.6mm brass wire or 2.3mm steel wire. High quality vinyl covering assures a positive grip.

STRAIGHT AND ANGLED TWEEZERS



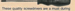
These tweezers will come in handy when handling small parts, nuts, screws, decals, etc. Made from stainless steel with a black cationic finish for long life. Your concentration is transmitted precisely through the tip of these precision tweezers.

CURVED SCISSORS FOR PLASTIC



These are quality scissors that will come in handy when trimming polycarbonate bodies of R/C car models. The curved blades enable easy access to polycarbonate body curves, and are made of high quality stainless steel for strength and long life. They can also cut plastic sheet up to 2mm in thickness.

(+) SCREWDRIVER No.2 L, No.1 M & (−) SCREWDRIVER No.1 M



These quality screwdrivers are a must during radio control car model construction. The impact resistant chrome vanadic alloy material was chosen for long life. The originally designed pentagonal grip molding is of acetylcellulose that has excellent durability and assures a firm grip when wanted.

ORIGINAL BODY

Body color is silver. Bumper is from 1/12 scale R/C Porsche 959.

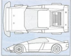
When looking at the world of radio controlled cars, we find that enthusiasts are beginning to make their own original bodies, as well as racing their models. The desire of controlling your sought after dream car can become a reality, with a little patience and effort, and will certainly stand out in the track. The important thing to remember when designing a car body is to obtain enough strength to withstand those collisions.

1. MAKING AN ORIGINAL BODY

When you have chosen the subject to create, sketch it out on your drawing board. When doing a model of a real car, go through magazines, catalogs, leaflets, etc. to obtain the best references. If its entirely your own design, make a rough sketch to get the correct image. Always remember to keep in mind the chassis on which the body is going to mount on. Check the speed controller position, wheel arches and any hindrances that could spoil the cars performance.

Do some image sketching.

Make a construction drawing based on your sketches.

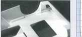


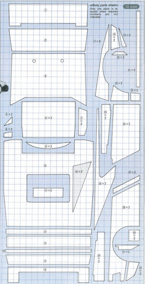
2. CONSTRUCTING

The example shown for our original body construction is made from plastic sheet cut into panels. The chassis used for this modification is a 1/12 scale R/C Toyota TOM'S endurance racer. Notice the layout of the panels used for composing the body, and how the dimensions match the drawing. The important point in cutting out the body parts is to draw the scribing line somewhat larger than the required dimension in order to allow easier fitting adjustments after the parts have been separated from the plastic sheet. Do not try to cut the parts from the sheet the first time, but scribe several times and gradually work through the sheet. For cutting parts that are going to have an opening within the panel as seen on part ⑨, cut the open part prior to cutting out the outside line. Sand off cutting edges and build accordingly, starting with figure 1. Apply plastic cement to both parts, and hold using cellophane tape until cement has cured. Panels glued together at the edges should be reinforced to obtain certain strength at the joints. The best way to do this is by using 5mm square beams as rein-

Smooth out rough edges.

Use reinforcing at joints.





◄Body parts sheet►

Only one piece is required when required numbers are not indicated.

Panels fitted into place.

forcement. After finishing construction from figures 1 through 3, mount the body on the chassis and check for any interference with the mechanics and wheel components. Also at this time, scribe the body mount position and drill 6mm holes. When body assembly is done, sand off and smooth out edges. Apply putty to reproduce the curves and to cover up unwanted seam lines.

3. PREPARING FOR PAINTING AND CONSTRUCTING SPOILER

Areas that have been puttied or sanded heavily may be rather rough for painting. Use fine sets of finishing abrasives to totally eliminate the roughness, for a smooth finish. A smooth finish prior to painting will enhance the overall finish when paint is applied. Use two panels for the rear spoiler parts and cement them together to make the spoiler. Scribe lightly, heat, and bend edge of spoiler, and finish off for painting by smoothing out edges.

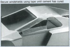
Apply putty and smooth out by sanding.

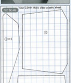
After sanding.

4. PAINTING AND ATTACHING WINDSHIELDS

Spray painting is recommended for overall painting of the body. Remove all dust and oil from the surface prior to painting (refer to PAINTING OF R/C CAR BODIES) and paint using lighter colors first, then on to darker colors. Spray a light coat for good paint adhesion and add another coat after it has dried. Completely dry and then cut out windshields from clear plastic sheet of 0.5mm, and install them using synthetic rubber cement. Hold it in place using paper or masking tape. Front and side windshields are reinforced using 2mm square beams.

Secure windshields using tape until cement has cured.





1/2 Scale

Use 0.5mm thick clear plastic sheet.

5. FINISHING

After finishing with the painting, apply the finishing touch by attaching rear spoiler and headlights. Use plastic material and clear plastic pipe to add accent details to the body. The example shows clear plastic pipe used on spoiler mounting and for exhausts. 2mm square beams are used to reproduce the engine grille located at the rear of the driver's compartment (figure 3). Even your own imaginative dream car can look just as real by adding details referring to photographs of full-sized exotic cars. Window frames and panel lines are easily represented using micro-tape. The Toyota TOM'S chassis does not have a protection bumper, therefore, the example shown utilizes a practice bumper used on the 1/12 scale R/C Porsche 959. Scratch built bodies are vulnerable to collision, and therefore it is essential to use bumpers for protection of your original body. Using scrap parts and decals from the same sized scale models will add that final touch toward realism.

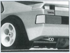


Fig. 1

Apply parts ⑤, ⑥, ⑦-⑨, ⑪, and ㉓ on both sides of body.

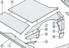


Fig. 2

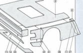
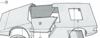


Fig. 3

Add reinforcing using 5mm square beams to large panel joints.

Apply parts ⑧, ㉔, and ㉕ on both sides of body.



Apply 2mm square beams on 1mm thick plastic sheet to reproduce engine grille.

Fig. 4

Use two layers of plastic sheet for parts ④ and reproduce curve by sanding.

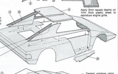
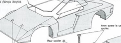


Fig. 5

Windshield is painted smoke (Tamiya Acrylics X-19).

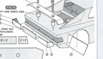


Cement windows using synthetic rubber cement.

Make body mount hole by measuring from chassis.

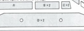
4mm screw is used to secure spoiler.

Fig. 6



◄Rear spoiler parts►

The taillamps are of 1.2mm thick plastic sheet and spoiler is made from two layers of 1.2mm thick plastic sheet glued together and bent at the edge.



5009 REAR SHAFT SET

5015 FUSE SET (15A)

5025 DOUBLE SIDED SERVO TAPE SET

5036 BALL BEARING SET (2 PCS.)

5038 TOOL SET

5039 BATTERY CONNECTOR SET (6V)

5054 VARIABLE RESISTOR SPEED CONTROL SWITCH

5068 BALL LINK & ADJUSTER ROD SET

5073 BALL BEARING SET (4 PCS.)

5090 SPECIAL PINION GEAR SET FOR 540 TYPE MOTOR (22 AND 24T)

5105 CIRCUIT BREAKER

5106 7.2V CONNECTOR SET

5112 1/10 RACING BUGGY STICKER SET

5117 1/10 RACING BUGGY UNIVERSAL JOINT

5128 1/10 RACING BUGGY UPRIGHT SET

5144 SPECIAL ROD END SET

5170 NYLON BAND SET

5171 HEAT RESISTANT DOUBLE SIDED SERVO TAPE SET

5172 RACING SPEED CONTROLLER

5173 DIFFERENTIAL GEAR (MEDIUM) SET

5174 ALUMINUM PINION GEAR SET (16 AND 17T)

5175 ALUMINUM PINION GEAR SET (18 AND 20T)

5186 SILICONE INSULATED WIRE

5189 RS-540SD BLACK MOTOR SPRINT

5192 SUBARU BRAT 540 PINION GEAR SET

5193 ADJUSTABLE RACING SHOCKS

5194 RUBBER BAG SET

5195 STEEL ANTENNA

5197 SNAP PIN SET

5200 RS-540SD BLACK MOTOR ENDURANCE

5204 DIRECTLY CONNECTED SERVO SAVER

5205 DIFFERENTIAL GEAR SET (BRAT, FROG, LANCIA)

5207 HALF SHAFT SET

5208 ORV BUMPER AND GUARD SET

5211 CERAMIC RESISTORS (TWO TERMINAL)

5212 CERAMIC RESISTOR (THREE TERMINAL)

5214 956 SPEED CONTROLLER

5215 956 REAR SHAFT

5218 FLAT WIRE WOUND RESISTOR

5220 PORSCHE 956 CHASSIS

5221 PORSCHE 956 MECHANISM DECK

5222 PORSCHE 956 RACING STICKER SET

5224 THE GRASSHOPPER H.P. SUSPENSION KIT

5228 PLASTIC BEARING SET

5232 NYLON UPRIGHT SET (2 PCS.)

5237 BUGGY SPEED CONTROLLER

5238 BUGGY PINION GEAR SET (13T, 14T)

5239 BUGGY PINION GEAR SET (15T, 16T)

5240 BUGGY PINION GEAR SET (17T, 19T)

5241 HOTSHOT BALL BEARING SET

5242 850 BALL BEARING SET (2 PCS.)

5244 HOTSHOT UPRIGHT SET

5245 SNAP CONNECTOR SET

5247 TOYOTA TOM'S BODY MOUNT SET

5246 TOYOTA TOM'S CHASSIS/FRAME

5248 DIFFERENTIAL BALL BEARING SET

5249 RECEIVER BATTERY ELIMINATOR FOR SANWA

5250 RECEIVER BATTERY ELIMINATOR FOR FUTABA A TYPE

5251 RECEIVER BATTERY ELIMINATOR FOR FUTABA B TYPE

5252 RECEIVER BATTERY ELIMINATOR FOR JR

5253 HORNET SPEED CONTROLLER SET (BEC)

5254 WILD ONE SPEED CONTROLLER SET (BEC)

5255 2 PIN MICRO CONNECTOR SET

5261 RECEIVER BATTERY ELIMINATOR FOR ACOMS

5262 RECEIVER BATTERY ELIMINATOR FOR KO

5264 6V BATTERY ADAPTER

5272 FOX FRONT STABILIZER

5273 HORNET DAMPER SET

5274 TAMIYA DAMPER OIL SET

5275 HOTSHOT UNDERGUARD

5279 F-1 FRONT CHASSIS

5280 HORNET SPARE CHASSIS

5276 HOTSHOT H.P. SUSPENSION SET

5280 F-1 SPEED CONTROLLER SET (BEC)

5282 SUPERSHOT SPEED CONTROLLER SET (BEC)

5284 BALL THRUST BEARING SET (2 PCS.)

5289 PLASTIC JOINT SHAFT SET

5290 RX-540VZ TECHNIGOLD MOTOR

5292 BIGWIG SPEED CONTROLLER SET (BEC)

5294 0.2Ω CERAMIC RESISTOR (THREE TERMINAL)

5295 8.4V BATTERY ADAPTER

5296 HOTSHOT 8.4V BATTERY HOLDER

5297 HOTSHOT PLASTIC GEAR SET

5298 4WD DRIVE SHAFT SHORT

5299 4WD DRIVE SHAFT LONG

5300 4WD FRONT JOINT CUP SET

5301 4WD REAR JOINT CUP SET

5304 C.V.A. LONG SHOCK UNIT SET

5305 C.V.A. SHORT SHOCK UNIT SET

5307 PORSCHE 959 SPEED CONTROLLER (BEC)

5310 959 GEAR SET

5311 959 HEADLIGHT SET

5312 RX-540VZ TECHNIGOLD MOTOR BRUSH SET

5314 7.2V FLASHING UNIT

5315 620 BALL BEARING SET

5119 ROUGH RIDER SPARE TIRE 'FRONT' WITH WHEEL

5120 ROUGH RIDER SPARE TIRE 'REAR' WITH WHEEL

5121 SAND SCORCHER SPARE TIRE 'FRONT' WITH WHEEL

5122 SAND SCORCHER SPARE TIRE 'REAR' WITH WHEEL

5156 FORD RANGER TIRE WITH WHEEL

5179 WILD WILLY TIRES WITH WHEEL

5183 BUGGY SPIKE TIRES (REAR) WITH WHEEL

5216 SPONGE TIRE (FRONT) WITH WHEEL

5217 SPONGE TIRE (REAR) WITH WHEEL

5233 4WD OVAL BLOCK TIRE FRONT WITH WHEEL

5234 4WD OVAL BLOCK TIRE REAR WITH WHEEL

5235 4WD PIN SPIKE TIRE FRONT WITH WHEEL

5236 4WD PIN SPIKE TIRE REAR WITH WHEEL

5256 2WD OVAL BLOCK TIRE REAR WITH WHEEL

5257 2WD PIN SPIKE TIRE REAR WITH WHEEL

5258 WILD ONE TIRE FRONT WITH WHEEL

5265 FOX PLATED WHEEL

5266 HOTSHOT PLATED WHEEL

5267 WILD ONE FRONT TIRE

5268 OVAL BLOCK FRONT TIRE

5269 OVAL BLOCK REAR TIRE

5270 PIN SPIKE FRONT TIRE

5271 PIN SPIKE REAR TIRE

5277 SPONGE TIRE (FRONT) WITH WHEEL

5278 SPONGE TIRE (REAR) WITH WHEEL

5287 FALCON FRONT TIRE WITH WHEEL

5288 FALCON REAR TIRE WITH WHEEL

5293 THE BIGWIG WHEEL SET

5303 2WD PIN SPIKE TIRE FRONT WITH WHEEL

5308 PORSCHE 959 RALLY TIRE WITH WHEEL

5309 PORSCHE 959 SLICK TIRE WITH WHEEL

5180 WILD WILLY BODY PARTS SET

5191 SUBARU BRAT BODY PARTS SET

5206 THE FROG BODY PARTS SET

5210 GRASSHOPPER BODY PARTS SET

5213 PORSCHE 956 BODY PARTS SET

5219 MITSUBISHI PAJERO BODY PARTS SET

5223 THE HORNET BODY PARTS SET

5229 TOYOTA TOM'S 84C BODY PARTS SET

5243 HOTSHOT BODY PARTS SET

5259 WILD ONE BODY PARTS SET

5260 TOYOTA TOM'S 85C-L BODY PARTS SET

5263 THE FOX BODY PARTS SET

5261 SUPERSHOT BODY PARTS SET

5265 BOOMERANG BODY PARTS SET

5266 THE FALCON BODY PARTS SET

5291 BIGWIG BODY PARTS SET

5302 BLACKFOOT BODY PARTS SET

5306 PORSCHE 959 BODY PARTS SET

5310 MONSTER BEETLE BODY PARTS SET

5316 STRIKER BODY PARTS SET

TAMIYA COLOR CATALOGUE

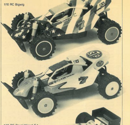
The latest in cars, boats, tanks and ships. Motorized, radio controlled and museum-quality models are all shown in full color in Tamiya's latest catalogue. At your nearest hobby supply house.

RC BACK PACK (6345)

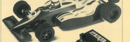
This is a multipurpose and a fashionable canvas back pack in khaki that comes in handy for transporting your RC car, tools, radio equipment and batteries. It makes bicycle riding easy and fun. The back pack can be also used as a shoulder bag by adjusting the belt strap. The set includes a pouch for your proportional unit.

Painting application examples

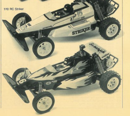
1/10 RC Bigwig



1/10 RC Road Wizard F-1



1/10 RC Striker



R/C SPARE PARTS

NO.		Leopard	Gepard	King Tiger	Porsche 956	TOM'S 84C	Road Wizard F-1			Wild Willy	The Frog	The Grasshopper	Hornet	Hotshot 4WD	Bruiser	Wild One	Fox	Supershot	Boomerang	Falcon	Bigwig	Blackfoot	Porsche 959	Monster Beetle	Striker			
5009	Rear Shaft Set																											
5015	Fuse Set (15A)		●	●																								
5025	Double Sided Servo Tape Set	●	●	●	●	●	●			●	●	●	●				●	●		●	●	●	●	●	●			
5036	Ball Bearing Set (2 pcs.)				●	●	●			●	●	●	●	●	●	●	●	●	●	●	●	●		●	●			
5038	Tool Set	●	●	●	●	●	●			●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●			
5039	Battery Connector Set (6V)	●	●	●	●	●	●			●	●	●	●	●	●	●	●		●	●	●	●		●				
5064	Variable Resistor Speed Control Switch	●	●	●																								
5068	Ball Link & Adjuster Rod Set	●	●	●	●	●	●				●	●	●		●	●				●		●	●	●	●			
5073	Ball Bearing Set (4 pcs.)				●	●				●	●	●	●	●	●	●	●	●	●	●	●	●		●	●			
5090	Special Pinion Gear Set for RS-540 Motor				●	●	●																					
5105	Circuit Breaker	●	●	●	●	●	●			●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●			
5106	7.2V Connector Set	●	●	●	●	●	●			●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●			
5112	1/10 Racing Buggy Sticker Set									●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●			
5117	1/10 Racing Buggy Universal Joint									●					●													
5119	Rough Rider Spare Tire 'Front' with Wheel										●	●	●			●				●					●			
5120	Rough Rider Spare Tire 'Rear' with Wheel										●	●	●			●												
5121	Sand Scorcher Spare Tire 'Front' with Wheel										●	●	●			●				●					●			
5122	Sand Scorcher Spare Tire 'Rear' with Wheel										●	●	●			●												
5128	1/10 Racing Buggy Upright Set										●																	
5144	Special Rod End Set	●	●	●	●	●	●			●	●	●	●			●				●					●			
5156	Ford Ranger Tire with Wheel										●	●	●			●												
5166	Honda F-2 Body Parts Set																											
5170	Nylon Band Set	●	●	●	●	●	●			●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●			
5171	Heat Resistant Double Sided Tape	●	●	●	●	●	●			●	●	●	●				●	●		●	●	●	●	●	●			
5172	Racing Speed Controller																											
5173	Differential Gear (Medium) Set				●	●	●																					
5174	Aluminum Pinion Gear Set (16 and 17T)				●	●	●																					
5175	Aluminum Pinion Gear Set (18 and 20T)				●	●	●																					
5179	Wild Willy Tires with Wheel									●																		
5180	Wild Willy Body Parts Set									●																		
5183	Buggy Spike Tires (Rear) with Wheel										●	●	●			●												
5186	Silicone Insulated Wire	●	●	●	●	●	●			●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●			
5189	RS-540SD Black Motor Sprint				●	●	●			*1	●	5192	●	●		●	●	●	●	●	●	●		●	●			
5191	Subaru Brat Body Parts Set										●																	
5192	Subaru Brat 540 Pinion Gear Set										●	●	●			●	●			●			●		●			
5193	Adjustable Racing Shocks										●	●				●						●		●				
5194	Rubber Bag Set	●	●	●	●	●	●			●	●	●	●	●	●	●	●	●	●	●	●	●		●	●			
5195	Steel Antenna				●	●	●							●			●	●	●		●							
5197	Snap Pin Set				●	●	●			●	●		●	●	●	●	●	●	●	●	●	●	●	●	●			
5200	RS-540SD Black Motor Endurance				●	●	●			*1	●	5192	●	●		●	●	●	●	●	●	●		●	●			
5204	Directly Connected Servo Saver				●	●	●				●	●	●	●	●	●	●	●	●	●	●				●			
5205	Differential Gear Set (Brat, Frog, Lancia)										●																	
5206	The Frog Body Parts Set										●																	
5207	Half Shaft Set										●					●						●		●				
5208	ORV Bumper & Guard Set										●	*2	*2			*2												
5210	Grasshopper Body Parts Set											●	*3															
5211	Ceramic Resistors (Two Terminal)									●	●				●		●	●										
5212	Ceramic Resistor (Three Terminal)											●	●			●			●	●		●		●	●			
5213	Porsche 956 Body Parts Set				●	●																						
5214	Porsche 956 Speed Controller				●	●																						
5215	Porsche 956 Rear Shaft				●	●	●																					
5216	Sponge Tires (Front-D) with Wheel				●	●																						
5217	Sponge Tires (Rear-H) with Wheel				●	●																						
5218	Flat Wire Wound Resistor				●	●	●																					
5219	Mitsubishi Pajero Body Parts Set																											
5220	Porsche 956 Chassis				●																							
5221	Porsche 956 Mechanism Deck				●	●																						
5222	Porsche 956 Racing Sticker Set				●																							
5223	The Hornet Body Parts Set											5224	●															
5224	The Grasshopper H.P. Suspension Kit											●	●															
5228	Plastic Bearing Set				●	●	●			●	●	●	●	●	●	●	●	●	●	●	●	●		●	●			
5229	Toyota TOM'S 84C Body Parts Set				●	●																						
5232	Nylon Upright Set (2 pcs.)				●	●	●					●	●			●				●					●			
5233	4WD Oval Block Tire Front with Wheel													●				●	●		●							
5234	4WD Oval Block Tire Rear with Wheel													●				●	●		●							
5235	4WD Pin Spike Tire Front with Wheel													●				●	●		●							
5236	4WD Pin Spike Tire Rear with Wheel													●				●	●		●							
5237	Buggy Speed Controller													●														
5238	Buggy Pinion Gear Set (13T, 14T)													●			14T	●	●		●							
5239	Buggy Pinion Gear Set (15T, 16T)										16T			●		15T	●	●	●		●							
5240	Buggy Pinion Gear Set (17T, 19T)										19T			17T			17T	17T	17T	19T	17T				19T			
5241	Hotshot Ball Bearing Set													●				●	●		●							
5242	850 Ball Bearing Set						●					●	●	●	●	●	●	●	●	●	●	●	●	●	●			
5243	Hotshot Body Parts Set													●				●										
5244	Hotshot Upright Set													●				●										
5245	Snap Connector Set	●	●	●	●	●	●			●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●			
5246	Toyota TOM'S Chassis/Frame				●	●																						
5247	Toyota TOM'S Body Mount Set				●	●																						
5248	Differential Ball Bearing Set				●	●	●																					
5249	Receiver Battery Eliminator For Sanwa				5280	5280	●				5253	5253	5253	●		5254	●	●	●	●	●	●	●	●	●			
5250	Receiver Battery Eliminator For Futaba A Type				5280	5280	●				5253	5253	5253	●		5254	●	●	●	●	●	●	●	●	●			
5251	Receiver Battery Eliminator For Futaba B Type				5280	5280	●				5253	5253	5253	●		5254	●	●	●	●	●	●	●	●	●			
5252	Receiver Battery Eliminator For JR				5280	5280	●				5253	5253	5253	●		5254	●	●	●	●	●	●	●	●	●			
5253	Hornet Speed Controller (BEC)										●	●	●						●			●		●	●			
5254	Wild One Speed Controller (BEC)															●				●								
5255	2 Pin Micro Connector Set						●										●	●	●	●	●	●	●	●	●			
5256	2WD Oval Block Tire Rear with Wheel										●	●	●			●	●			●					●			
5257	2WD Pin Spike Tire Rear with Wheel										●	●	●			●	●			●					●			
5258	Wild One Tire Front with Wheel										●	●	●			●	●			●					●			
5259	Wild One Body Parts Set															●												

R/C SPARE PARTS

NO.		Leopard	Gepard	King Tiger	Porsche 956	TOM'S 84C	Road Wizard F-1			Wild Willy	The Frog	The Grasshopper	Hornet	Hotshot 4WD	Bruiser
5260	Toyota TOM'S 85C-L Body Parts Set				●	●									
5261	Receiver Battery Eliminator For Acoms				5280	5280	●				5253	5253	5253	●	
5262	Receiver Battery Eliminator For KO				5280	5280	●				5253	5253	5253	●	
5263	The Fox Body Parts Set														
5264	6V Battery Adapter				●	●	●			●	●		●	●	●
5265	Fox Plated Wheel										●	●	●		
5266	Hotshot Plated Wheel													●	
5267	Wild One Front Tire										5265	5265	5265		
5268	Oval Block Front Tire													●	
5269	Oval Block Rear Tire										5265	5265	5265	●	
5270	Pin Spike Front Tire													●	
5271	Pin Spike Rear Tire										5265	5265	5265	●	
5272	Fox Front Stabilizer														
5273	Hornet Damper Set												●		
5274	Tamiya Damper Oil						●				●	5224	●	●	●
5275	Hotshot Underguard													●	
5276	Hotshot H.P. Suspension Set													●	
5277	Sponge Tire Front-E with Wheel						●								
5278	Sponge Tire Rear-J with Wheel						●								
5279	F-1 Front Chassis						●								
5280	F-1 Speed Controller (BEC)						●								
5281	Supershot Body Parts Set													5276	
5282	Supershot Speed Controller Set (BEC)													●	
5283	Hornet Spare Chassis											●	●		
5284	Ball Thrust Bearing Set (2 pcs.)													●	
5285	Boomerang Body Parts Set														
5286	Falcon Body Parts Set														
5287	Falcon Front Tire										●	●	●		
5288	Falcon Rear Tire										●	●	●		
5289	Plastic Joint Shaft Set														
5290	RX-540VZ Technigold Motor				●	●	●				●	5192	●	●	
5291	Bigwig Body Parts Set														
5292	Bigwig Speed Controller (BEC)														
5293	The Bigwig Wheel Set													●	
5294	O.Z.O Ceramic Resistor (Three Terminal)											●	●		
5295	8.4V Battery Adapter													5296	
5296	Hotshot 8.4V Battery Holder													●	
5297	Hotshot Plastic Gear Set													●	
5298	4WD Drive Shaft Short													●	
5299	4WD Drive Shaft Long													●	
5300	4WD Front Joint Cup Set													●	
5301	4WD Rear Joint Cup Set													●	
5302	Blackfoot Body Parts Set														
5303	2WD Pin Spike Tire Front with Wheel										●	●	●		
5304	C.V.A. Long Shock Unit Set														
5305	C.V.A. Short Shock Unit Set														
5306	Porsche 959 Body Parts Set														
5307	Porsche 959 Speed Controller														
5308	Porsche 959 Rally Tire with Wheel														
5309	Porsche 959 Slick Tire with Wheel														
5310	959 Gear Set														
5311	959 Headlight Set														
5312	RX-540VZ Technigold Brush Set				*4	*4	*4				*4	*4	*4	*4	
5313	Monster Beetle Body Parts Set														
5314	7.2V Flashing Unit														
5315	620 Ball Bearing Set														
5316	Striker Body Parts Set														

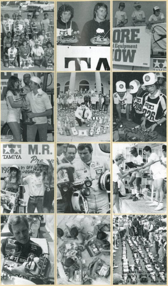
●denoted parts are used by itself.
The 4 figure parts in the diagram are extra spare parts required with the listed spare parts.
Indicated pinion 14T, 15T, 16T, 17T and 19T shown in diagram can be used.
*1 A Wild Willy pinion gear is required.
*2 Only the bumper is used.
*3 Remove front body mount and cut away portions interfering with the suspension mount to attach.
*4 Used when utilizing RX-540VZ Technigold motor (5290).
*5 Requires 8.4V Battery Adapter (5295) & Hotshot 8.4V Battery Holder (5296).
*6 Requires 8.4V Battery Adapter (5295).
⊛ Requires 6V Battery Adapter (5264).

POWER SOURCE

NO.		Leopard	Gepard	King Tiger	Porsche 956	TOM'S 84C	Road Wizard F-1			Wild Willy	The Frog	The Grasshopper	Hornet	Hotshot 4WD	Bruiser
5502	Ni-Cd Battery 6V	●	●	●	●	●	●			●	●	●	●	●	●
5508	Ni-Cd Battery 7.2V	●	●	●						●	●	5224	●	●	●
5512	Ni-Cd 6V-4000mAh Battery														●
5515	Ni-Cd Racing Pack 7.2V-1200mAh	●	●	●	●	●	●				●	5224	●	●	●
5516	Ni-Cd Mini Pack 6V-150mAh	●	●	●						●	●	●	●		●
5525	Ni-Cd Battery 8.4V Gold Power													*5	
CHARGER															
5506	Ni-Cd Battery Quick Charger 6V	●	●	●	●	●	●			●	●	●	●	●	●
5514	Ni-Cd Battery Quick Charger 6V-4000mAh														●
5510	Ni-Cd Battery Quick Charger 7.2V	●	●	●	●	●	●			●	●	●	●	●	●

Wild One	Fox	Supershot	Boomerang	Falcon	Bigwig	Blackfoot	Porsche 959	Monster Beetle	Striker
[illegible]	●	●	●	●	●	●	●	●	●
[illegible]	●	●	●	●	●	●	●	●	●
	●								
●	●		●	●	●	●		●	●
●	●			●					●
		●	●		●				
●	●			5265					5265
		●	●		●				
●	●	●	●	5265	●				5265
		●	●		●				
●	●	●	●	5265	●				5265
	●								
●									
●	●	●	●	●	●	5205	●	●	5205
		●							
		●							
		●							
		●							
		●	●		●		●		
			●						
				●					
●				●					●
●	●			●					●
				●					●
●	●	●	●	●	●	●	●	●	●
					●				
					●				
		●	●		●				
●			●	●	●	●	●	●	●
		1200	●		●				
		●							
		●	●		●				
		●							
		●	●		●				
		●	●		●				
		●	●		●				
						●		●	
●	●			●					●
		●	●		●				
	●	●	●	●	●	●		●	●
							●		
							●		
							●		
							●		
							●		
							●		
84	84	84	84	84	●	84	●	84	84
						●		●	
							●		
							●		
									●

WORLD R/C SCENES



1/10 SCALE RADIO CONTROL CAR

5835	Wild Willy
5841	The Frog
5843	The Grasshopper
5845	The Hornet
5847	Hotshot 4WD
5848	Toyota 4×4 Pickup Bruiser
5850	Wild One
5851	The Fox
5853	Road Wizard F-1
5854	Supershot
5855	The Boomerang
5856	The Falcon
5857	The Bigwig
5858	Ford F-150 Ranger Blackfoot
5860	Monster Beetle
5861	Striker

1/12 SCALE RADIO CONTROL CAR

5842	Porsche 956 Racing Master Mk.5
5849	Toyota TOM'S 84C Racing Master Mk.6
5859	Porsche 959 4WD

1/16 SCALE R/C TANK SERIES

5602	West German Leopard A4 Tank
5603	West German Flakpanzer Gepard
5604	German King Tiger

BATTERY AND QUICK CHARGER

5502	Ni-Cd Battery 6V
5506	Ni-Cd Battery Quick Charger 6V
5508	Ni-Cd Battery 7.2V
5510	Ni-Cd Battery Quick Charger 7.2V
5512	Ni-Cd 6V-4000mAh Battery
5514	Ni-Cd Battery Quick Charger 6V-4000mAh
5515	Ni-Cd Racing Pack 7.2V-1200mAh
5516	Ni-Cd Mini Pack 6V-150mAh
5520	Ni-Cd N-3U Battery (2 pcs.)
5525	Ni-Cd Battery 8.4V-1200mAh Gold Power

MAINTENANCE MATERIAL & COLOR

8703	Tamiya Cement (40ml)
8704	Tamiya Liquid Thread Lock
8705	Tamiya Spray Oil
8706	Tamiya Putty
8709	Tamiya Finishing Abrasives (Medium Set)
8710	Tamiya Finishing Abrasives (Fine Set)
8711	Tamiya Cement Pen
8712	Tamiya Cement (20ml)
8713-8719	Tamiya Modeling Brushes
8720	Tamiya Epoxy Putty
8721	Tamiya Rubbing/Polising Compound
8722	Tamiya Molybdenum Grease
8723	Tamiya Switch Lubricant
8724	Tamiya Finishing Abrasives (Ultra Fine Set)
8725	Ceramic Grease
Tamiya Acrylic Paint (68 colors + Thinner + Flat Base)	
9801-9812	Tamiya Paint Marker (12 colors)
8201-8212	Tamiya Color for Polycarbonate (12 colors)

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TAMIYA COLOR
ACRYLIC PAINT

Tamiya Acrylic Paints are made from water-soluble acrylic resins and are excellent for either brush or spray painting. These paints can be used on styrol resins, styrofoam, wood, glass, and metal, plus all of the common model plastics. The paint covers well, flows smoothly with no blushing or fading, and can be blended easily. Each bottle contains 23ml, and come in 16 glossy colors, 45 matt colors, 7 transparent colors plus the exclusive thinner and flat base.

BECAUSE THEY ARE WATER-SOLUBLE, BUT PERMANENT WHEN DRY, CLEAN-UP IS BOTH QUICK AND EASY WITH PLAIN WATER.

Being water-soluble, the paints can be completely removed from brushes and other implements with plain water if done prior to drying. After the paints have cured, they are permanent and water will have no effect on the finished surface. The large, heavy glass bottles are stable and difficult to upset, and the large caps are easy to open and close. With the caps molded in the same color of the paint, it is easy to select the shade or color desired quickly. These colors are ideal for beginners and young children just getting into the hobby, as they are safe and provide an excellent finish.

THINNER IS USEFUL FOR SPRAY PAINTING AND THE FLAT BASE WILL TONE DOWN THE GLOSS.

The thinner is used for removing dried paint from brushes and spraying implements, plus adjusting the viscosity of the paints for effective spray painting. When the paint is too thick, it is difficult to brush it on evenly, so thin it down a little with the thinner. When spray painting mix ten parts of paint with 2 parts of thinner for best results. The flat base is almost indispensable in modeling as a true gloss is not always desired. For a semi-gloss color, mix 10 parts paint with 1 part of flat base, and to achieve a flat color, mix 3 parts of base to 10 parts of paint.

EXCELLENT WHEN TWO OR MORE COLORS ARE REQUIRED FOR SPECIAL EFFECTS.

Overpainting in two or more colors, such as camouflage, is quite easy as the prepainted base color, when dried, is permanent and not effected by the overcoat. Acrylics can be painted over any other type of paint with no problems; however, never overpaint acrylics with lacquers. Prior to masking off the model for painting, be sure that the paint is completely cured before the tape is applied. When spray painting, remember that several light coats are preferable to one heavy coat, and the drying time will be considerably lessened.

- Never use lacquer paints over acrylics.
- Surface to be painted must be dry and dust free.
- Mix paint by gently stirring. Shaking bottle will cause bubbles.

CLEAR COLORS PROVIDE NEW VERSATILITY.

Tamiya's Acrylic color line contains six transparent colors plus a gloss clear finish. Motorized vehicle models use many colored lamps such as tail lights, turn signals, fog lights etc. Painting these parts with the appropriate color, will bring the model to a greater degree of realism. Clear red is used for the tail lamps, clear yellow for fog lights, and you can use the smoke shade for windows and sun roofs. The clear blue, smoke and orange can be used to make motorcycle exhaust pipes stained with heat.

For revolving lights

Painting plated parts with clear yellow, such as wheels, will make them look gold plated.

For winkers

TO PROVIDE A REALISTIC METALLIC COLOR COATING.

When applying clear smoke color to the engine and suspension system of cars and motorcycles, then wiping away the excess, all of the small parts such as nuts and bolts will stand out realistically and give the appearance of being used. If a small amount of flat base is added, this technique is very effective on aircraft and tank models. Using the clear orange and blue to the exhaust pipes of motorcycles and racing cars will give them the heated and burnt look of the real machines. Painting yellow or orange over chrome plated parts will turn them into gold or copper plated fittings. Spray painting of clear colors over a base metallic paint, such as car bodies, will give them the deep, multilayered paint scheme look.

Painting a base coat of silver, then overpainting with a clear color, you have a true metallic painted surface.

CLEAR COLORS WILL NOT HIDE THE WOOD GRAIN, AND PROVIDE A GLOSSY DURABLE FINISH.

Clear color allows light to pass through, and if you use this principle on transparent plastic, you can duplicate the stained glass effect. Edging the color line with dark grey or black will simulate the lead caulking separating the different colored glass. Painting glass bottles with clear colors will turn them into colorful interior decorations.

- Clear colors can be mixed with other clear colors for different shades and can also be lightened using the transparent clear.

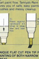
For heated exhaust pipes.

TAMIYA PAINT MARKER

Easy and professional results can be yours with Tamiya's Paint Markers. Use it as you would a marking pen. Enamel paint formulated for the painting of plastics. Even the unskilled painter can now achieve beautiful results on their models. For expert modelers, it is indispensable for detail painting and time saving. Excellent for wood, metal, glass as well as on all plastics. Contents: 8 grams.

EXCITING NEW RELEASE FOR FINISHING MODELS OF PLASTIC AND OTHER MEDIUMS.

Shake paint marker well first, then push tip against a firm surface to break seal and start paint flow. Tamiya's Paint Marker ensures you of safe, easy painting without brushes and messy cleanup.

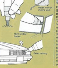


①: Press against cardboard 4-5 times to break seal and start flow.

②: Test by painting on scrap first.

UNIQUE FLAT CUT PEN TIP FOR PAINTING OF BOTH NARROW AND WIDE AREAS

Model painting and detailing with a brush requires a fine technique, learned with years of practice. Tamiya's Paint Marker with its tough felt tip frees you from the worry of lack of experience and allows you to detail your subject like never before. The flat cut tip is 4mm wide and 1mm thick. Use the narrow edge to paint small areas, stripes or markings. By using the marker like a flat brush you can paint wide areas and expect a beautiful smooth flowing finish because of the enamel paint characteristics. With its unique tip, it is easy to paint projecting parts with no overflow; badges and emblems of cars; motorcycles and figures. Raised surfaces on moulded parts can be highlighted with a light touch of the marker for added realism. Accessories on military models, lights and landing gear detail are now easy to finish realistically. When necessary, the marker tip can be cut to a desired thickness by a knife, for those special applications.



Use on raised surfaces

Repair worn-off chrome work

Paint window frames

Detail painting

TAMIYA PAINT MARKER 12 COLORS

X1	Black	Gloss finish
X2	White	Gloss finish
X3	Royal Blue	Gloss finish
X5	Green	Gloss finish
X6	Orange	Gloss finish
X7	Red	Gloss finish
X8	Lemon Yellow	Gloss finish
X11	Chrome Silver	Metallic
X12	Gold Leaf	Metallic
XF1	Flat Black	Matt finish
XF15	Flat Flesh	Matt finish
XF56	Metallic Grey	Matt finish

USE IN COMBINATION WITH TAMIYA ACRYLIC PAINTS.

Enamel paints can be applied over acrylics and lacquers, so the Tamiya Paint Marker can be used to detail stripe, lettering and markings without fear of damaging the undersurface. Tamiya Acrylic Paints can also be applied over Tamiya Paint Marker finishes, so using the two in combination will enhance your model finishing techniques and achieve results that will amaze you.

SAME COLOR NAMES, SHADES AND NUMBER AS TAMIYA ACRYLIC PAINTS.

Color names and numbers of the Tamiya Paint Marker match those of Tamiya Acrylic paints, and the color toning between the two is almost perfect. Excellent gloss and matt.

TAMIYA COLOR
FOR POLYCARBONATE

These paints have been formulated for use on Polycarbonate (Lexan) R/C car bodies. For brush and spray painting. Each bottle contains 23ml. There are 12 bright colors to beautify your clear car bodies.

EASY TO USE, SAFE AND WATER-SOLUBLE. THE PAINT IS SHOCK RESISTANT, PERMANENT AND FLEXIBLE.

Tamiya polycarbonate paints are water-soluble and completely safe. They can be removed from brushes and other implements using plain water, if done prior to drying, making clean-up quick and easy. After the paint has cured, it is resistant to oils as well as water. It is extremely durable and long lasting. As these paints were specially formulated for car bodies, the paint film has good elasticity after curing and is not likely to peel or chip off when the body flexes during collisions. As it is resistant to oils, it is suitable for gas engined vehicles also.

EXCELLENT COVERAGE MAKES FOR LIGHT WEIGHT.

It is important when painting polycarbonate bodies to wash them first with a detergent solution to remove all dust and oils. Paint details such as window frames, panel lines etc., first, then the overall body. Since the Tamiya polycarbonate paints are opaque, they have good covering qualities with thin coats, making for a lightweight R/C car body, which is extremely important for competition vehicles.

Paint these bodies from the inside.

MIXING OF COLORS AND OVERPAINTING IS EASY.

Painting in two or more colors and complicated patterns is not difficult, and the colors mix easily to match any hue you desire. As the paint is applied from the inside, but viewed from the outside, paint the dark colors first, followed by the lighter shades. When using masking tape, remove the tape prior to the paint completely drying, due to its flexibility and tendency for the paint to peel from the body after being cured. If the paint should want to peel away when removing the tape, run a sharp hobby knife along the tape edge. The tape will then come off cleanly without removing the paint from the surface. When spray painting, thin by adding 4 parts of acrylic thinner to 10 parts of paint. The thinner is also useful for removing cured paint from brushes and unwanted areas.

Resists collision damage

Use plain water for clean-up.

For engine powered models also

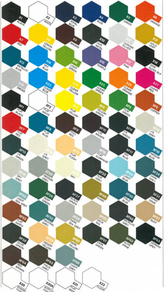
- The painted surface will remain vulnerable to scratches and marring until cured, even though tack free, for about 24 hours.

TAMIYA COLOR FOR POLYCARBONATE 12 COLORS

PC-1	White
PC-2	Red
PC-3	Light Blue
PC-4	Blue
PC-5	Black
PC-6	Yellow
PC-7	Orange
PC-8	Light Green
PC-9	Green
PC-10	Purple
PC-11	Pink
PC-12	Silver

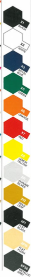
TAMIYA COLOR ACRYLIC PAINT

66 COLORS PLUS THINNER & FLAT BASE



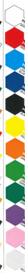
TAMIYA PAINT MARKER

12 COLORS



TAMIYA COLOR FOR POLYCARBONATE

12 COLORS



TAMIYA COLOR ACRYLIC PAINT

●Glossy basic color

X1	Black	Gloss Black
X2	White	Gloss White
X3	Royal Blue	Gloss Navy Blue
X4	Blue	Gloss Blue
X5	Green	Gloss Green
X6	Orange	Gloss Orange
X7	Red	Gloss Red
X8	Lemon Yellow	Gloss Bright Yellow
X9	Brown	Gloss Brown
X14	Sky Blue	Gloss Sky Blue
X15	Light Green	Gloss Lime Green
X16	Purple	Gloss Purple
X17	Pink	Gloss Pink
X18	Semi Gloss Black	

●Transparent basic color

X19	Smoke	Smoke glass
X22	Clear	Gloss finish
X23	Clear Blue	Warning lamp
X24	Clear Yellow	Fog lamp
X25	Clear Green	Navigation light
X26	Clear Orange	Blinkers
X27	Clear Red	Taillamp

●Matt finish basic color

XF1	Flat Black	Matt Black
XF2	Flat White	Matt White
XF3	Flat Yellow	Matt Yellow
XF4	Yellow Green	Matt Yellow Green
XF5	Flat Green	Matt Light Green
XF7	Flat Red	Matt Red
XF8	Flat Blue	Matt Blue
XF10	Flat Brown	Matt Brown

●For painting of tanks

XF49	Khaki	Seats, bags, etc.
XF52	Flat Earth	British and Italian tanks
XF57	Buff	Camouflage on U.S. tanks
XF58	Olive Green	U.S. tanks
XF59	Desert Yellow	British tanks seen in the desert
XF60	Dark Yellow	German tanks
XF61	Dark Green	British or Russian tanks
XF62	Olive Drab	U.S. and other modern tanks
XF63	German Grey	German tanks
XF64	Red Brown	German and British tanks
XF66	Light Grey	Interior of tanks

●For painting of figures

XF1	Flat Black	German tank crews
XF49	Khaki	Japanese Army infantry on the southern border
XF50	Field Blue	German Air Force crew
XF51	Khaki Drab	U.S. and Russian Army infantry
XF58	Olive Green	U.S. Army infantry
XF59	Desert Yellow	British Army in Africa
XF60	Dark Yellow	German Africa Corps
XF65	Field Grey	German Defence Army
XF10	Flat Brown	Hair, leather and wood part of guns
XF15	Flat Flesh	Face
XF57	Buff	Bag etc.

●For metallic painting

X10	Gun Metal	Iron or gun barrel
X11	Chrome Silver	Glittering silver
X12	Gold Leaf	Glittering gold
X13	Metallic Blue	Interior of Japanese aircraft
XF6	Copper	Copper part
XF16	Flat Aluminum	Matt finish silver
XF56	Metallic Grey	Dark matt finish silver

●For painting of Japanese planes

XF11	J.N Green	Upper side of the Navy plane
XF12	J.N Grey	Lower side of the Navy plane
XF13	J.A Green	Upper side of the Army plane
XF14	J.A Grey	Lower side of the Army plane
XF16	Flat Aluminum	Silver fuselage without coloring
X13	Metallic Blue	Interior of the plane

●For painting of U.S. planes

XF2	Flat White	Lower side of the Navy plane
XF4	Yellow Green	Interior of the plane
XF16	Flat Aluminum	Silver fuselage without coloring
XF17	Sea Blue	Camouflage on Navy plane
XF18	Medium Blue	Camouflage on Navy plane
XF19	Sky Grey	Overall painting of Navy plane
XF53	Neutral Grey	Lower side of Army plane
XF62	Olive Drab	Upper side of Army plane

●For painting of British planes

XF20	Medium Grey	Lower side of the plane
XF21	Sky	Lower side of the plane
XF54	Dark Sea Grey	Camouflage
XF60	Dark Yellow	Camouflage
XF61	Dark Green	Camouflage
XF64	Red Brown	Camouflage

●For painting of German planes

XF22	RLM Grey	Interior of the plane
XF23	Light Blue	Lower side of the plane
XF24	Dark Grey	Camouflage
XF26	Deep Green	Camouflage
XF27	Black Green	Camouflage
XF66	Light Grey	Camouflage

●For painting of ships

XF9	Hull Red	Bottom of the hull
XF25	Light Sea Grey	Hull of British ships
XF53	Neutral Grey	Light hull coloring
XF24	Dark Grey	Dark hull coloring
XF55	Deck Tan	Wooden deck

●Matt Finish Agent

X21 Flat Base

Use to reduce the gloss of paint. The gloss is adjustable by changing the mixing ratio.

●For thinning paint or cleaning of brushes

X20A Acrylic Thinner 3 kinds of bottles

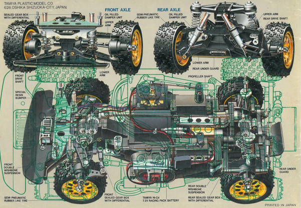
Use for adjustment of paint shades and for cleaning painting implements.

TAMIYA RADIO CONTROL GUIDE BOOK

TAMIYA

MODEL RECTIFIER CORPORATION
2500 Woodbridge Avenue,
Edison, N.J. 08817 (201) 985-7800

TAMIYA PLASTIC MODEL CO.
628, OSHIKA SHIZUOKA-CITY, JAPAN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UPPER ARM
LOWER ARM
REAR AXLE
SEMI-PNEUMATIC RUBBER LIKE TIRE
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REAR DRIVE SHAFT
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